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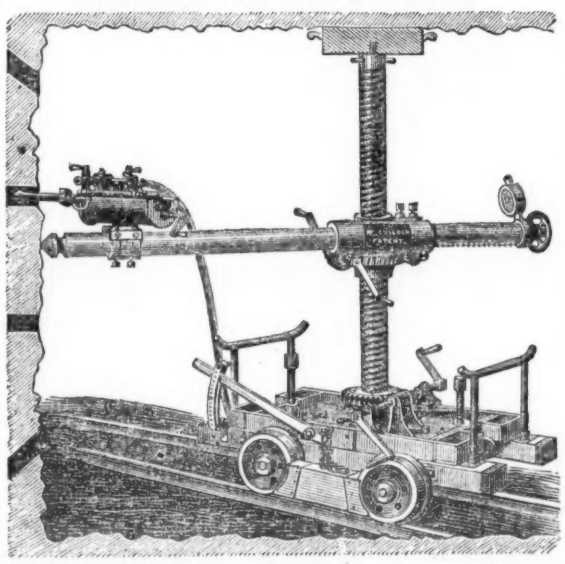

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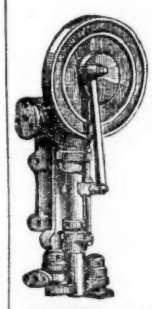

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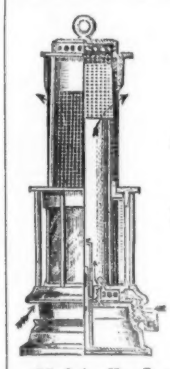

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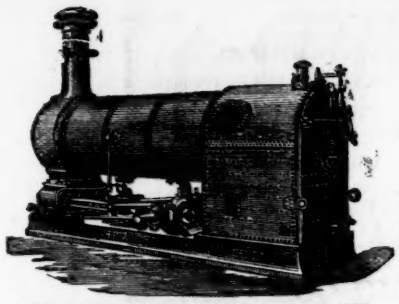

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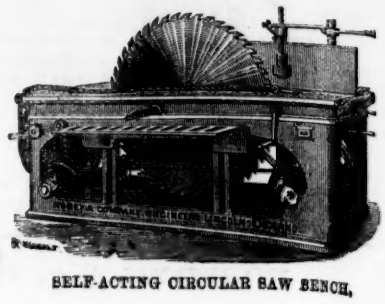

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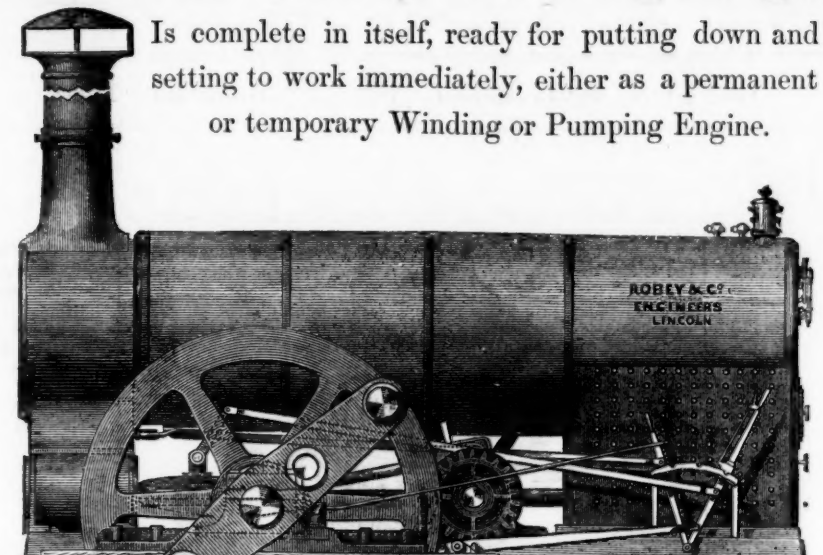

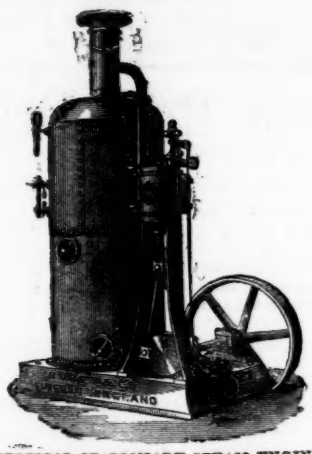

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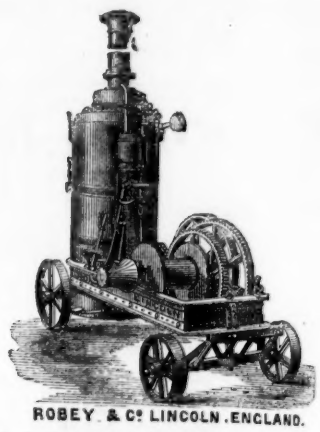

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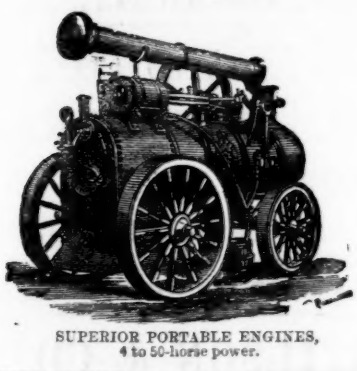

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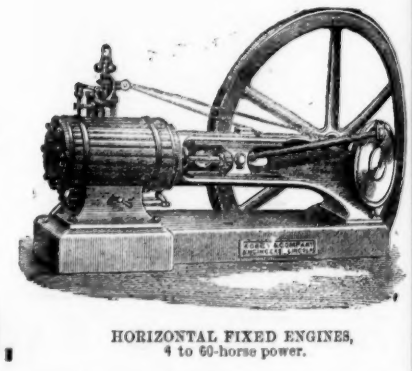

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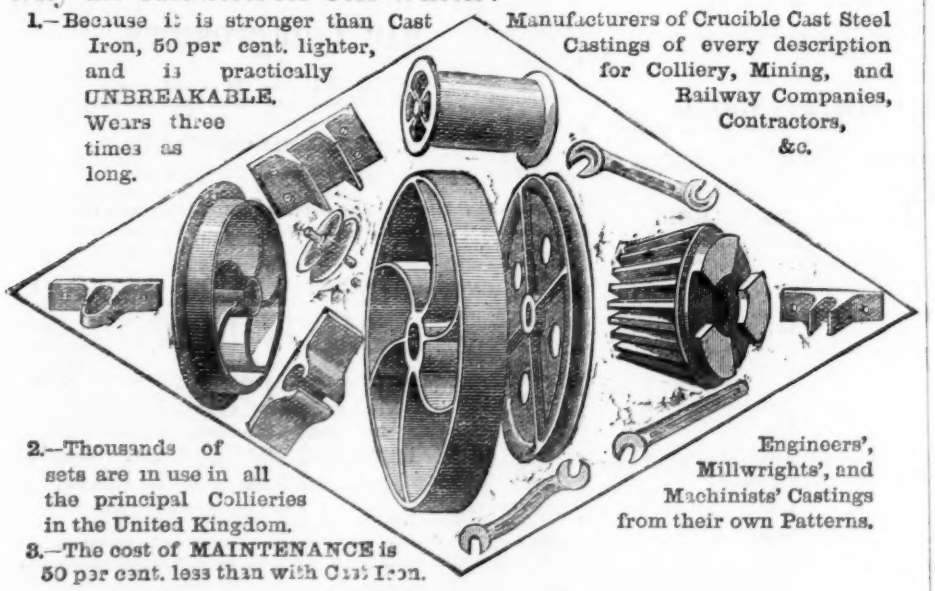

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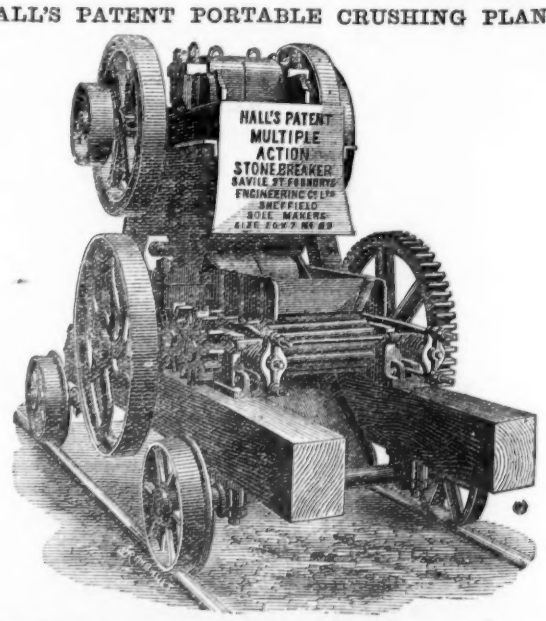

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MINERAL STATISTICS OF THE UNITED KINGDOM FOR THE YEAR 1879.—No. III.

IRON ORE.—The total output of the iron mines of the United Kingdom in the past year amounted to 14,379,735 tons; of this quantity 9,248,886 tons were obtained from mines and workings not in our coal fields, the quantity obtained from the latter source amounting to 5,130,849 tons. Comparing these figures with those for the year 1878 a considerable falling off appears, amounting to 1,346,635 tons, the total production in 1878 being 15,726,370 tons, of which 5,405,777 tons were obtained from the clay and blackband measures of the coal fields, and 10,320,593 tons from iron ore mines in districts other than those of the coal measures. The value of the iron ore raised in 1879 at the place of production was 4,962,434*l.*, compared with 5,609,507*l.* in the previous year, the difference in the value showing a decrease of 647,073*l.* The decrease in quantity and value would doubtless have been greater than we have stated, but it will be remembered that the closing months of the year 1879 witnessed a revival of the iron ore and pig-iron industries, inducing for a time renewed activity and better prices, but not sufficient to bring the returns of production up to the figures for 1878.

In the first of the following summaries appears the iron ore raised in 1879, from mines and workings not in the coal measures, giving a total as previously stated of 9,248,886 tons, valued at 2,397,010*l.*:—

Counties, &c.	Quantities. Tons.	cwts.	Value. £.	s.	d.
Cornwall	400	0	240	0	0
Devonshire	592	19	296	9	6
Somersetshire	14,100	0	10,147	10	0
Gloucestershire	58,551	18	35,091	2	0
Wiltshire	47,623	0	9,524	12	0
Oxfordshire	1,233	0	215	15	6
Northamptonshire	1,211,406	10	175,558	4	0
Lincolnshire	695,326	0	103,037	5	0
Staffordshire, North	36,832	3	20,257	1	0
Lancashire	976,822	14	532,585	3	6
Cumberland	1,227,006	0	674,586	11	0
Westmoreland	1,454	0	727	0	0
Yorkshire, North Riding	4,750,000	9	712,500	0	0
Northumberland & Durham	16,679	0	10,007	0	0
North Wales	392	11	166	16	6
So. Wales and Monmouthshire	53,811	0	32,286	12	0
Ireland	155,833	5	79,286	12	0
Scotland	492	0	369	0	0
Isle of Man	230	0	128	0	0
Total	9,248,886	0	2,397,010	14	0
Argillaceous & blackband obtained from coal measures	5,130,849	0	2,565,424	0	0
Gross total	14,379,735	0	4,962,434	14	0

The argillaceous and blackband ores were obtained from the undermentioned coal fields in the quantities and values given, according to returns made to the Keeper of Mining Records:—

Counties.	Quantities. Tons.	Value. £.	s.	d.
England				
Gloucestershire	270	135	0	0
Shropshire	300,391	150,195	10	0
Warwickshire	16,214	8,107	0	0
Derbyshire	146,341	73,170	10	0
Nottinghamshire	20,000	10,000	0	0
Staffordshire, North	1,039,266	519,633	0	0
Staffordshire, South	483,507	241,753	0	0
Yorkshire	321,789	160,894	10	0
Lancashire	2,255	1,127	10	0
Durham and Northumberland	4,965	2,482	10	0
Wales—				
North Wales	38,936	19,468	0	0
South Wales	299,000	149,500	0	0
Scotland—				
Eastern Division	706,926	1,228,957	0	0
Western Division	1,750,989			
Total	5,130,849	2,565,424	0	0

An examination of the values of the ores in the several districts show generally that the prices ruling in the previous year were maintained, with few exceptions. In Northamptonshire the ores of hydrated oxide at pit's bank, delivered into truck, varied from 2s. 6d. to 3s. 6d., and in a few cases to 4s. per ton of 2400 lbs. The Lancashire ores of red hematite from 8s. 6d. to 10s., and in a few mines raising best blast ore 15s. per ton; similar prices prevailed in the Cumberland pits, while in the Cleveland district the argillaceous carbonates did not realise more than from 2s. 9d. to 3s. 3d. per ton, compared with 3s. to 3s. 6d. per ton in 1878. Many difficulties appear to stand in the way of obtaining the exact values of the Cleveland ores—the first is stated as the large proportion which is consumed in the furnaces of the mineowners, and in regard to which there is, therefore, no sale; a second difficulty exists in the fact that a large proportion of the ore is delivered under contracts made many years since, and some of these contracts have many years to run, at prices which are no guide to the existing values. From 2s. 9d. to 3s. has been the price determined by those who are in a position to give an opinion, and has accordingly been adopted.

The ironstones of the coal measures give an average of 10s. per ton in 1879, the same price being the average of 1878, while in 1877 the price was nearly 12s. per ton.

Of the ironstones raised in Scotland in 1879 blackband contributed 1,322,668 tons, and clayband 1,135,247 tons. Following the distribution of iron ore and ironstone in 1879 and 1878, the quantities carried by railway and canal were as follows, a few unimportant quantities being omitted:—

Railways and canals.	1879—tons.	1878—tons.
Midland	846,352	898,381
Manchester, Sheffield, and Lincolnshire	229,771	298,488
North Staffordshire	299,039	308,466
Furness, from Lancashire	882,945	879,480
Furness, from Cumberland	721,917	946,782
Whitehaven, Cleator, and Egremont	901,339	1,052,001
North Eastern	4,190,050	4,999,448
Great Western	37,586	56,111
Trent and Mersey Navigation	75,864	92,209
Total carried	8,184,863	9,531,369

Comparing the movement of iron ore by railway and canal in 1879 with 1878 a difference appears of 1,346,506 tons, which quantity corresponds within a few tons of the actual decrease of production already referred to in the beginning of our notice, amounting to 1,346,635 tons, a fact verifying in a remarkable manner the accuracy of the returns in the year 1879, and testifying to the care and ability exercised in their preparation. In addition to the ores raised in the United Kingdom there were imported 1,085,045 tons, of the value of 1,050,167*l.*, against 1,173,411 tons, of the value of 1,162,851*l.*, in the previous year. The "purple ores" obtained from the metal extraction works yielded 332,000 tons in 1879, compared with 400,000 tons in 1878, these ores are the residue of the cupreous pyrites imported after being operated upon in the metal extraction works, the sulphur and copper being separated, and they contain upwards of 60 per cent. of metallic iron,

PIG-IRON MANUFACTURE.—Summarising the iron ore returns, the ores imported, and the purple ores in 1879, the total amount returned as smelted in the ironworks of Great Britain was 15,797,080 tons, compared with 17,299,781 tons in 1878. The ores imported were derived from the following countries—their respective values are also given:—

Russia	Tons 4,043	£	22,455
Spain	1,007,617		918,276
Italy	43,763		49,713
Turkey	4,881		34,271
Algeria	18,911		18,317
Other countries	5,830		7,135
Total	1,085,045		£1,050,167

In the year 1879 the number of blast-furnaces more or less actively employed was 496¾, against 498 in 1878, and 540 in 1877. The following summary shows the number of furnaces built and in blast in 1879 in each of our iron making districts, the pig-iron made, together with the quantities of coal employed in its manufacture:—

Counties.	Furnaces. Built.	In blast.	Pig-iron made. Tons.	Coal used. Tons.
England—				
Northumberland	4...	2	557,255...	1,161,587
Durham	71...	31		
Yorkshire, North Riding	90...	70 ...	1,210,091...	2,589,660
Yorkshire, W. Riding	49...	31 ...	218,805...	556,775
Derbyshire	53...	35 ...	291,455...	765,821
Lancashire	49...	37 ...	631,343...	1,167,408
Cumberland	51...	27½ ...	531,638...	1,005,497
Shropshire	23...	7 ...	60,790...	156,507
North Staffordshire	35...	23½ ...	210,374...	430,432
South Staffordshire	140...	44 ...	325,780...	742,006
Northamptonshire	23...	17 ...	165,317...	428,557
Lincolnshire	21...	14 ...	131,678...	261,395
Gloucestershire	9...	2		
Wiltshire	4...	2		
Hampshire	1...	0 ...	40,000...	105,000
Somersetshire	1...	0		
Total	624...	343 ...	4,374,526...	9,370,645
North Wales—				
Denbighshire	9...	3		
Flintshire	2...	0 ...	18,953...	35,804
South Wales—				
Anthracite furnaces	11...	4		
Bituminous coal district: Glamorganshie	75...	23 ...	332,174...	684,249
Monmouthshire	57...	27 ...	337,684...	769,894
Total of Wales	154...	57 ...	688,881...	1,489,947
Scotland	151...	96¾ ...	932,000...	2,256,819
Total of Great Britain	929...	496¾ ...	5,995,337...	13,117,411

The average consumption of coal in 1879 was for the whole kingdom 44 cwts. to each ton of pig-iron made; ten years ago it exceeded 60 cwts. of coal. In some districts a larger consumption of coal appears; in the West Riding of Yorkshire, where the cold-blast is chiefly employed, the average is 51 cwts. of coal, in Monmouthshire 45 cwts., while in Lancashire and Cumberland, where Durham coke is extensively used, the average did not in 1879 exceed 37 cwts.

The pig-iron made and coal used in its manufacture in the five years ending 1879 will indicate the marked economy secured in recent years:—

Year.	Furnaces. Built.	In blast.	Pig-iron. Tons.	Coal used. Tons.
1875	959	629	6,365,462	15,645,774
1876	927	585½	6,555,997	15,598,381
1877	940	540	6,608,664	15,342,445
1878	948	498	6,381,051	14,112,305
1879	929	496¾	5,995,337	13,117,411

With the revival of trade towards the close of the year 1879 the market prices of pig-iron rose; thus Cleveland pig quoted in January at 39s. 9d. rose to 55s. per ton in December; West Cumberland Bessemer pig, in like manner, at 55s. in January was 95s. in December. Scotch pig also fluctuated, commencing in January at 42s. 7d. per ton, receding to 41s. 5d. in June, and eventually rising in December to 50s. 4d. per ton. The prices of the several varieties of pig-iron were quoted as follows in 1879; the prices in the two previous years will afford data for comparison:—

Description of pig-iron.	1879.	1878.	1877.
Cleveland	£2 1 2	£2 2 3	£2 3 6
West Cumberland	2 17 6	3 0 0	3 12 6
South Staffordshire	3 7 9	3 18 9	3 18 6
South Wales	2 17 6	2 18 6	3 12 6
Scotland	2 10 4	2 8 6	2 14 4

Turning to the annual statement of the Board of Trade, from which the exported quantities of pig-iron are obtained, we find the total exports in 1879 amounted to 1,222,516 tons, of the value of 3,146,960*l.*, against 922,968 tons, of the value of 2,467,372*l.*, in 1878, and 879,672 tons, valued at 2,518,192*l.*, in 1877. In the annexed statement appears the details of pig-iron in 1879 and 1878, giving the countries to which exported, and the quantities received:—

Countries receiving exports.	1879. Tons	1878. Tons
Russia	146,830	85,241
Sweden and Norway	20,130	20,725
Denmark	11,760	8,569
Germany	233,900	228,434
Holland	213,386	240,969
Belgium	83,750	90,318
France	85,520	96,358
Portugal	12,364	—
Spain	44,370	29,300
Italy	27,995	20,565
United States, Atlantic	275,049	28,642
" " Pacific	—	4,021
Australia	15,291	13,307
British North America	28,910	23,324
Other countries	23,261	32,925
Total	1,222,516	922,698

MILLS AND FORGES.—From the summary of returns of these works and the rolling-mills it appears that the 314 works making returns had 5149 puddling-furnaces and 846 rolling-mills more or less actively engaged in 1879, compared with 5125 puddling-furnaces and 830 rolling-mills in 1878. With the partial revival of trade in October, 1879, and after operations were extended, but from the general depression prevailing during the previous months of the year it is estimated that from 9 to 10 per cent. less fuel was consumed in these works than in the previous years, while in many districts it was even greater.

STEEL MANUFACTURE.—Open hearth and Bessemer processes. Some 28 firms were in the past year engaged in the manufacture of steel by the open hearth steel melting, employing a total of 129 furnaces, while in the year 1878 there were 16 firms, employing 94 furnaces. Turning to the recently-published report of the British Iron Trade Association, the subjoined table appears, showing the production of the open hearth steelworks in Great Britain in 1879, amounting to 175,000 tons:—

District.	Furnaces erected.	Production of steel.
South Wales	48	Tons 85,000
Scotland	16	50,000
Sheffield	15	21,000
Lancashire and Cheshire	12	15,000
North-East Coast	5	1,000
Other districts	6	3,000
Totals	102	175,000

The number of firms engaged in the manufacture of steel in crucibles by the Siemen's regenerative gas furnaces remains the same as in 1878—seven, and the production in 1879 some 2900 tons, which appears to be a trifle under the make of 1878, and about 1000 tons less than that of 1877.

The number of firms engaged in the manufacture of steel by the Bessemer process has been increased by three during the year 1879, the Darlington Iron Company, with two converters, commencing operations in June of the present year, the Standard Iron and Steel Company with two converters, while the Erimus Steelworks of Middlesborough have in course of erection two 6-ton converters, intended to manufacture steel by the Thomas-Gilchrist process. In the following table will be found the make of Bessemer steel ingots in each of the years 1878 and 1879, according to the returns of the British Iron Trade Association:—

Districts.	Ingots—1878. Tons	Ingots—1879. Tons
Sheffield	293,223	210,346
South Wales	203,552	252,573
Lancashire	139,463	152,130
Cumberland	90,990	127,163
North-East Coast	74,007	85,299
Staffordshire	6,292	7,200
Total	807,527	834,711

These totals show an increase in production of 17,186 tons in 1879 compared with the previous year. The following is a complete list of Bessemer steelworks in Great Britain in the year 1879, with the number and capacity of the converters:—

Number.	Name and situation of works.	Converters.	Capacity. Tons	c.
1	Henry Bessemer and Co. [L.], Sheffield	2	3	0
		2	5	0
2	Bolckow, Vaughan, & Co. [L.], Middlesborough	4	8	0
3	John Brown and Co. [L.], Sheffield	4	7	10
		2	10	0
4	Charles Cammell & Co., Cyclops Works, Sheffield	4	4	0
5	Ditto, Grimesthorpe, Sheffield	2	5	0
		2	7	0
6	Sheffield Steel & Iron Works, Attercliffe, Sheff.	2	4	0
	Brown, Bayley, and Dixon [L.]	4	8	0
7	Weardale Iron Co., Tudhoe, Ferryhill, Durham	2	2	10
8	Glasgow Bessmr. Steel Co. [L.], Atlas Works, Glas.	2	3	0
9	Samuel Fox & Co., Stockbridge Works, Sheffield	2	5	0
10	Lloyd's, Foster, and Co., Old Park, Wednesbury	4	3	0
11	Bolton Iron and Steel Co., Bolton, Lancashire	4	5	0
12	London and North Western Railway, Crewe	2	3	0
13	Manchester, Sheffield, and Lincolnshire Railway Company, Gawton Works, Manchester	4	3	10
14	Mersey Steel & Iron Works, Toxteth Park, L'pool.	10	5	0
15	Manchester Steel and Railway Plant Company, Gibraltar Works, Newton Heath, Manchester	4	3	0
16	Barrow Hematite Steel Co., Barrow, Lancashire	8	7	0
17	Dowlais Iron Co., Dowlais, Glamorganshire	2	5	0
		2	6	0
		2	7	10
18	Ebbw Vale Co., Ebbw Vale Monmouthshire	4	8	0
		2	10	0
19	West Cumbrlnd. Iron & Steel Co., Workington	2	6	0
		2	8	0
20	Phœnix Bessemer Steel Works, the Ickles, near Sheffield, Steel, Tozer, and Hampton [L.]	2	2	0
		2	6	0
		2	8	0
21	Carnforth Hemat. Iron Co. [L.] Carnforth, Lanc.	2	6	0
22	Erimus Steel Work, Middlesbro', Chas. E. Muller	2	6	0
23	Darlington Iron Co., Darlington, Durham	2		—
24	Moss Bay Hematite Iron and Steel Co., Workington Cumberland	3	8	0
25	Rhymney Iron Co. [L.], Rhymney, Monmouthsh.	3	7	0
26	Blaenavon Iron & Steel Co [L.], Blaenavon, Mon.	2	8	0
27	Standard Iron and Steel Company	2		—

TIN-PLATE MANUFACTURE.—From the summary of tin-plate works in the United Kingdom in the year 1879 there appears to be 78 works erected, of these 43 are situated in South Wales, 10 in Staffordshire and Worcestershire, 21 in Monmouthshire and Gloucestershire, 1 in Cumberland, 2 in Scotland, and 1 in North Wales. The number of mills built in the above 78 works is 294, of which number 210 were in operation in 1879, producing tin, terne, and black plates. The total number of boxes made in 1879 amounted to 4,250,345, compared with 4,058,000 boxes in the previous year, showing an increase of 192,345 boxes. The total weight of tin-plate made in 1879 being equal to 190,567 tons. The production of 1879 was very widely distributed, 3,534,169 boxes being exported, against 2,837,776 boxes in 1878, and 2,819,098 boxes in the year 1877. The details of these exports are as follows:—

Countries to which exported.	Boxes—1879.	Boxes—1878.	Boxes—1877.
United States	2,755,421	1,931,128	1,943,444
Holland, Germany, & Belgium	159,362	149,640	121,884
Australia and New Zealand	42,081	63,578	76,855
Italy and Mediterranean	108,977	141,691	91,675
Canada and British N. America	120,798	103,284	167,592
France and Switzerland	75,311	97,928	97,517
South America and Brazil	48,537	62,676	54,402
Spain and Portugal	61,225	70,101	68,612
Norway and Sweden	81,029	103,008	88,298
India and China	63,431	92,260	86,369
West Indies	9,346	12,033	12,891
Cape, Ceylon, and Mauritius	3,414	3,080	3,174
Africa and outside islands	4,242	5,676	4,478
Unclassed	995	1,693	1,907
Total boxes	3,534,169	2,837,776	2,819,098

From the above it will be seen that our best customers are the United States of America, to whom nearly four-fifths of all exported were consigned. The declared value of the above exports being respectively, according to the official returns of the Board of Trade, 3,521,671*l.*, 2,732,378*l.*, and 3,033,126*l.*

In concluding our notice of the iron industries of Great Britain for the year 1879, it only remains to add that the produce of each iron mine selling ore with the value appear in the pages of the Mineral Statistics, as well as complete lists of our ironworks, mills, forges, and rolling-mills, also steelworks and tin-plate establishments, forming in itself a complete directory to the metallurgical works of the iron trade. Commercial reports of late give much encouragement for the future, and it will be gratifying to us when the volume for 1880 appears to be able to chronicle a more prosperous year's progress.

SELF-EXTINGUISHING SAFETY LAMP.—The glock, instead of bein an ordinary screw as used in the present lamp, is in the improved lamp invented by Messrs. ALLEN and GRAHAM, of Liskeard, a bevelled steel bolt fitted vertically into the reservoir of the lamp, and projecting through the top is kept in position by a steel spiral spring contained in a tin cylinder fixed inside the reservoir of the lamp. A steel stud is screwed in the side of the outer case, and projects about 3-16ths of an inch inside the lamp, passing a bolt on the bevelled side when screwing up the lamp, and consequently locking itself. To open the lamp it is necessary to release the rod from the loop at the bottom of the lamp, and draw it downwards until the lower edge of the extinguisher comes in contact with the top part of the bolt, and which will bring the under side of the top of the extinguisher about ¼ in. above the burner tube; by continuing to draw the extinguisher down it puts out any light that may then be in the lamp, and at the same time allows the stud to pass the bolt on the top of its bevelled part, when the lamp can be unscrewed in the ordinary manner. When the pressure is taken off the bolt resumes its original position by means of a spiral spring. The extinguisher is made with corrugations at the side, and a number of small holes at the top to allow the flame to escape above it, preventing the possibility of the flame escaping through the gauze by the too quick drawing down of the extinguisher.

UNITING LEAD PIPING.—The invention of Mr. E. M. HUGENTOBLER, of Paris, consists of a cylindrical bushing of suitable internal diameter to correspond with that of the piping. This bushing, which may be of seamless brass, copper, galvanised tubing, or other convenient material (tinned where necessary) has its outer side covered with solder cast upon it in the shape of a double truncated cone, and at the junction of the coned bases formed into a shoulder or collar, against which to press the ends of the piping. In the case of the connection of faucets and branches, or where the junction is of more than two ends of piping, the bushing is made of a T or other suitable form, the truncated cones tapering towards each end of the piping to be connected, and each arm corresponding in internal diameter with the pipe it is to enter. The ends of the piping to be united are flared or enlarged by means of a tapering tool or mandrel, or where the size of the piping admits of it their interior diameter may be rhimed out, so that they may fit tightly on the bushing and press with their ends against the shoulder or collar. A suitable flux having been applied to the solder, if necessary, and the pipe ends fitted on to the bushing, heat is applied by means of a plumbers' tool, torch, blow-pipe, or in other convenient manner until the solder is melted, which may be perceived by the softening of the shoulder or collar.

Original Correspondence.

NEW YORK, LAKE ERIE, AND WESTERN RAILROAD COMPANY.

SIR,—Allow me to draw the attention of your readers to the Six per Cent. Gold Income Bonds, now quoted 79 to 81. The dividend for the whole year of 6 per cent. is payable on Wednesday, Dec. 1, 1880, and as the total bonds ranking for a dividend is only $508,008, equal to 101,601*l.*, requiring 6096*l.* annual interest. The net earnings of the railroad exceed 1,000,000*l.* per annum. The Gold Income Bonds receive their dividend of 6 per cent. before any interest is paid on the $8,536,900 Six per Cent. Preference shares and the $78,000,000 Ordinary shares. It will be seen that the amount of the Gold Income Bonds is so insignificant compared to the preference and ordinary capital of the company—in fact, the preference shares represent 16 times, and the ordinary no less than 154 times, the amount of the Six per Cent. Gold Income Bonds, which receive the full year's dividend of 6*l.* in ten weeks' time, or at the rate of 8 per cent. on the present prices of the bonds.—*London, Sept.* 23. B. E.

MEXICAN BONDS OF 1864.

SIR,—Many weeks ago you were good enough to call attention to these bonds in the Journal as worthy of investment, in view of the probable settlement by the Mexican Government. Since that date the bonds have risen in value. The newspapers now indicate that this settlement is at hand, and that the Government of Mexico are prepared to act honourably to their creditors. As these bonds, 100*l.* each, carry a number of unpaid coupons, the present price, about 12⅔, appears very favourable for investment. OBSERVER.

COLLIERY EXPLOSIONS.

SIR,—Can anyone give a satisfactory explanation of the question why the clothes are blown off men by an explosion? It is a well-known fact that in large explosions—and I see it is so at Seaham—that many bodies are found not much burned, and in some cases not burned at all, where they were literally naked—clothes, shoes, stockings all blown off, a bit of garter or a bit of necktie being all that was left. Now, these bodies so found are not tossed about or mangled, but one would almost think have had the clothes blown off without change of posture. I think there is not the least likelihood of their having been removed by the men themselves. AN ENGINEER.

COLLIERY EXPLOSIONS.

SIR,—The deplorable loss of life in this case, the frequent recurrence of such accidents in England, and the observation in The Times, that "it is singular so very few theories are broached to account for the disaster," appear to me, in the interest of humanity, to make it the imperative duty of anyone to come forward who thinks he can aid in any way in preventing or even diminishing the recurrence of accidents apparently so discreditable to the age we live in. I, therefore, feel compelled, after more than 20 years' experience of mining in Germany, and especially in the coal-mining of Rhineland and Westphalian provinces, to call the public attention of Englishmen to the difference in the systems of ventilation applied in England and here, which in my opinion tends to prevent the frequent occurence of gas explosions here.

I have had in the last 25 years five large collieries won and "exploited" under my direction, each capable of putting out 1000 to 1500 tons of coal per day—sinking and completing the shafts for coal works on the most approved English system of the day, with special permission of the German mining authorities, and opening out the mines and carrying on the coal work and ventilation mainly in conformity with the established system and rules of mining in this country; and, though employing 800 to 1200 men per day at each colliery, our loss of human life from explosions has been very small indeed, though the mines consist of gas, steam, and coking coal, yielding much of explosive gases.

At an early period, owing to the great number of the seams of coal (as many as 50 to 60 in some collieries) and the steep inclination of the seams in most cases, the Germans were led into a system, which became an established rule with the mining authorities, of driving at a high level across the coal formation a sufficiently large stone drift or gallery on the so-called "wetter sohle," above which no coal is allowed to be worked, and up into which the explosive gases, being lighter than air, naturally ascend, or, if I might use the expression, drain off, with the return air, and are carried off to-day by the upcast shaft of the colliery.

This "wetter sohle" is placed at a prescribed depth below the surface of the coal measures, whether they crop out to the day or are covered, as in the northern part of this coal basin, with 300 to 1000 or more feet in height of diluvium chalk, or other formations.

Return air courses are, I am quite aware, driven in England, especially in the Durham and Northumberland collieries, through many of which I travelled more than 20 years ago; but they were not then, nor are they, I believe, now, constructed on the principles and general system I have referred to; and I may add, to avoid all misunderstanding, my humble testimony to the great talent, skill, energy, and attention which at that time were, and still more now, no doubt, are devoted by the mining engineers and colliery managers of the north of England to ventilation.

Still, as in the recent discovery of a very simple process of dephosphorising iron, there may be, and I am quite sure there must be, a process or a system in the construction and working of collieries by which this deplorable loss of life and damage to property may be avoided, or at least greatly reduced; possibly, too, the very simplicity of the remedy causes it to elude attention in these days of complex and scientific research.

I do not presume here to propose a remedy, but, apart from any discoveries which may be made for chemically destroying the dangerous qualities of the gases with which we have to deal in coal mines, I wish to draw the attention of engineers and practical men to the cardinal point of providing independent means, from the highest points of the workings to the rise of a colliery, by ascending passages and a "wetter sohle" drift, for the rapid and uninterrupted escape of explosive gases, not only from the seams at work, but still more from the "goafs" and from old worked-out seams, which form, especially in the flat-lying seams of England, such dangerous magazines of gas.

I must not occupy your valuable space in discussing by anticipation the objections and questions of cost which such a proposition may give rise to, but come to the main practical purpose of this letter, merely remarking as a simple popular explanation that, as water is heavier than air, we make descending passages for its natural drainage: and the gases in question being lighter than air, ascending passages should be made for their natural escape.

I, therefore, take leave to suggest that the Secretary of State for the Home Department should at his earliest convenience appoint an English commission of practical and scientific men to enquire into and report on the whole question, which is of so much importance not only to Great Britain, but to Germany, Belgium, France, and other coal-producing countries, and that this commission should be instructed in the first instance to visit Prussia, where I am convinced every information will with pleasure be afforded by the mining authorities under the direction of the present able Minister of Public Works, and where, on the part of the Mining Association of this district, of which I have the honour to be a member of council, I can personally assure such a commission a hearty welcome and access to every information.

For such an investigation, whether by a separate commission or by the Government Inspectors of Mines, and for affording to the public the most detailed information as to the coal mining in this country, rarely has there been so favourable an opportunity as that afforded by the present industrial exhibition at Düsseldorf, not only of all the coal products in every state of preparation, but plans and cross-sections of all the great collieries of the district, showing in the greatest detail all their workings, system of ventilation, means and machinery for ventilation, and all other purposes connected with the working of collieries and mines in general and their statistics.

Such a complete collection of practical information on coal mining has to my knowledge never before been brought together in any exhibition, and is not likely for many years to come to be again produced.

The Iron and Steel Institute, in their late meeting at Düsseldorf, found this exhibition, as regards the objects of their enquiries, highly interesting and useful; and, in my opinion, that of the coal will not, at least, be less so to the practical mining engineers and coal-owners of England.

The Düsseldorf Exhibition closes at the end of this month.

WILLIAM J. MULVANY.
Member of the North of England Institute of Mining and Mechanical Engineers, and formerly Commissioner of Public Works in Ireland.

Pempelfort, Düsseldorf, Sept. 12.

THE SEAHAM COLLIERY EXPLOSION.

SIR,—The explosion at Seaham Colliery, I fear, will have taken away the confidence which many had in the security of our Northern mines, owing to the absence of any serious accident of this kind for many years. I have no doubt this explosion, with others which have preceded it, will lead to some further measures of safety being adopted. I believe you have given all the information in the way of preventing such calamities. It will be well if the practices which have been the cause of so many explosions will be enquired into, and measures to put a stop to them taken. The three articles in last week's *Mining Journal* might with advantage be read by the Government authorities and others who will have influence in making new provisions for the safety of miners in the future. MINER.

Newcastle-on-Tyne, Sept. 22.

LIGHTING OF MINES BY ELECTRICITY.

SIR,—The frequency of casualties in coal mines seems to demand that science shall, if it be possible, give us some safer substitute for the lamps at present in use. One of your correspondents suggests a lamp formed of wire, rendered incandescent by electricity, and to this, it seems to me, there would be no insuperable practical objection. But would not a light derived from electrical vacuum tube be even safer and more economical? A small portable coil, bichromate of potash battery, and tube would be sufficient, while, as to safety, the breakage of the tube would occasion the simultaneous extinction of the light, for the vacuum is the condition of its existence. The danger, except from darkness, would, therefore, be eliminated altogether. Anderson's new constant battery would seem to be very suitable for this purpose. I shall be glad if a discussion can be originated on the subject, and, as the result, an effective and practical light provided. A. K. R.

LONDON COAL SUPPLY.

SIR,—With reference to this important traffic permit me to state that, *via* the Wash, house coal from South Yorkshire to metropolitan consumers' premises, in each case, from pit's mouth can be delivered at over 3s. per ton saving on the mere conveyance rate with attendant expenses (say) on the Tyne exceptionally depressed summer freight of 3s. 10½d. per ton, the conveyance by rail at Great Northern's published maximum rate from South Yorkshire. The rate being less from Notts and Derbyshire the saving is augmented.

As to gas coal from South Yorkshire—basing my outcome upon the information of the largest coalowner in the South Yorkshire coal field the day after his return from visiting Tyneside—it is deplorable to witness the large quantity of the finest household coal stacked in South Yorkshire undergoing daily decrepitation, &c., which, *via* the Wash, could find its way to the various metropolitan and French gasworks, rendering practicable the remunerative employment of numerous miners—700 men discharged by one company alone.

As to steam coal, the Paris market can take some million tons at a saving of 10s. a ton, *via* the Seine, on present and for a lengthened period existing current prices of indigenous Belgian and English coals, the first Paris coal firm guaranteeing all sales. This vast undertaking requires discreet manipulation to satisfy the different coal districts—*Little Tower-street, Sept.* 24. W. J. THOMPSON.

THE PATENT OFFICE REPORT.

SIR,—The only two countries that have no onerous restrictions as to the compulsory working of a patent within a limited time after issue, and also periodically, on pain of forfeiture, and that do not forbid importation of the patented article, are Great Britain and the United States; but while our stamp duties on patents are the most oppressive, those of the United States are the lightest. A comparison, therefore, of the results of these two systems, so widely differing in the highly important matter of expense, is not only of great interest, but is of importance as being likely to throw some light on the cause of the extraordinary influx of American small tools and manufactured goods, which are visible everywhere, and which appear to be in considerable demand. Permit me, therefore, to lay before you the following table, which clearly shows the chief opposite effects of the two systems during the year 1879, in which year, it so happens, fewer patents were granted in the United States, and (with the exception of 1878, when there were 48 more) a greater number of patents were granted in this country than in any of the preceding ten years, consequently an average of the last ten years shows still more to our disadvantage:—

1879.	British Isles.		United States.
Receipts	£ 189,454	.....	£ 140,786
Expenditure	45,224	.....	105,928
Profits	144,230	.....	34,859
Stamp duties on one patent	175	.....	7
Duration of patent	14 years.	.....	17 years.
Number of patents applied for*	5,338	.....	19,391
Number of patents granted*	3,481	.....	12,343
Percent. of applications granted	65	.....	64
Number of applications refused or abandoned	1,877	.....	7,048
Percent. of grants paid 50*l.* duty	30	.....	—
Percet. of grants paid 100*l.* duty	11	.....	—
Population	34,500,000	.....	50,900,000
No. persons to one patent granted	9,968	.....	4,124
Ratio of amount of duties on one patent	25	.....	1
Ratio of number of patents granted	1	.....	2·42
Average cost to inventor for one patent (including patent agent's charges)	190	.....	19
Ditto disclaimer (including patent agent's charges)	28	.....	12
Technical examin. of application	None.	.....	Careful.
Inventions invalidly re-patented	Frequently.	.....	Rarely.

* Not including re-issues and design patents.

The figures given in the American report include design patents, which are nowhere stated separately. The applications for these last year were about 700—that is, 3 1-3 per cent. on the report's total of 20,059, which includes design patents. Deducting this percentage from this total we get 19,391 as the number of patents applied for; similarly deducting 3 per cent. from the report's total of 12,725, we get 12,343 as the number of patents granted.

We can scarcely be surprised that the Americans are generally looked upon as the most ingenious and practical of all nations, when for every patent granted in this the leading manufacturing country they, the greatest agricultural nation, are able to grant 2½, or, taking the average of ten years, more than 3. The reason of this is that their invention is carefully encouraged and protected as the true and ever acting cause of the nation's success (as frequently stated in official reports to Congress), whilst ours is subjected to exceptionally heavy fines. It is noteworthy that last year the large proportion of 70 per cent. of the patents sealed were unable to pay the 50*l.* tax at the end of three years, and that a further 19 per cent. were crushed out by the 100*l.* tax at the end of seven years. The taxes on only one British patent would suffice to pay those on 25 American patents, and yet the average duration of a British patent, including even all the provisional patents that last but six months, is only about four years.

The theory on which patents are granted in the United States is the direct opposite to that ruling here. There the patentee is regarded as benefiting the nation to a large degree, and himself only to a small degree; but here he is most frequently looked upon as a hateful monopolist, to be got rid of as soon as possible. Our experience in finding the Americans so frequently underselling us in our own markets, and the fact that they are seriously encroaching upon our standard industries, prove their theory to be the correct one.

As the prosperity and commercial existence of this country are dependent upon its manufactures and products, it behoves us to remove every obstacle to their being improved and cheapened, and it is evident that we have in our excessive stamp duties on patents one of the most serious obstacles possible, but which can, however, be easily removed without loss to the revenue.

Charing Cross, Sept. 20. FRANK W. GRIERSON,
Assoc. Inst. Nav. Archts.

RUSSIAN COAL FIELDS.—No. II.

OZOEERIT AND PETROLEUM.

SIR,—It is curious to watch the fires on the plains of Seraikani, in the neighbourhood of Baku, which is the largest port on the western shore of the Caspian Sea. A gas forces its way through the ground from unknown depths; the Holy Fires of Baku, as they are called, being the ignition of this gas, have been for ages worshipped by a sect named "Zorasters," or fire worshippers. However, in this utilitarian age these fires have been much desecrated, by being used to burn lime, &c. Wherever the gas forces itself through the ground, limestone is piled up in heaps over it and ignited. Besides, the gas is also to a large extent collected into underground reservoirs at one extensive petroleum refining works, and conducted at considerable pressure all through the establishment to fire the engine boilers, light the engine house, fire the stills, and light up the village within the walls and precincts of the works. This phenomenon of the gas is not confined exclusively to the plains, for on the opposite side of the Bay of Baku, and about four miles from the town and a mile and a half from the shore, you may see the surface of the water on a calm day for at least 100 acres in a semi-boiling condition, arising from the large volume of gas forcing its way through the body of water, which gas is often set alight when an illumination is required, which will remain sometimes for days burning, until a gale stronger than the force of gas emitted sets in and extinguishes it. The Zoraster's monastery at Seraikani is mostly converted into workmen's barracks connected with the works. The last of the priests, or devotees, of the fireworshipers now only remains in the person of one Hindoo, who goes through his ceremonial in accordance with the demand from visitors. I am not sure that in a pecuniary sense he is not much better off now than before, since the gas has been utilised, that being his peculiar property, as he leases the gas, and the Monastery save two rooms, to the petroleum works for a yearly sum, reserving to himself the right to use what gas he requires for his own purpose.

The petroleum oil wells at Boulakani, at about the same distance from Baku, are very numerous indeed. The oil extracted therefrom is drawn into large reservoirs, and in some instances in deep depressions in the land, which form huge petrolelum lakes, from whence as and when required it is pumped through iron tubes, running for miles along the plains to the port of Baku, most of which, together with pumping stations have been laid by the eminent firm of Easton, Anderson, and Co., of London, in first rate style, by their energetic and clever engineer and courteous representative Mr. Griffith.

All the steamers on the Caspian sea are fueled with the residue from the oil after distillation. It is much more economical than coal in every way, and far cleaner, and when the flow is properly regulated by the engineer there is actually no smoke at any time. This residue, which for years was thrown away or burned in the open, has now on the spot become of more value than the refined oil. Crossing the sea from Baku due east you arrive at Krasnovodsk, one of the Russian head quarters and depôt, which is certainly not a lively place; but I experienced considerable kindness from the officers and people generally, which to a great extent made up for the dulness of the place. It is built on the shore, surrounded by an arid waste, broken by towering and mostly perpendicular cliffs and steep hills, perfectly bare, with the exception of a few low growing rock plants, and these found only in the more secluded ravines; and the only denizens of these hills being the wild goat and the "Gerat" of the same tribe, but smaller build, with black spiral sharp pointed horns, the grey fox and sand rat. There are also an abundance of eagles of several descriptions, notably the golden and the black. In the summer there are (as in the Baku district) the usual crop of scorpions and Phalango spiders, which is a poisonous biting insect with a double set of sharp edged jaws. The whole country for hundreds of miles on the Khiva and Bokhara roads is similar to that at Krasnovodsk. The seaweeds both at this side and on the opposite side of the Caspian, also on the north at Dahgestan, are all of beautiful delicate growth, as also in colour, many of which are highly charged with iodine, as the various specimens I have collected from all the points I touched at will show. There are no large kinds to be found in this sea. The varieties of shells are few in number, and diminutive in size generally, but some beautiful in form, the largest and most abundant being the cockle and the mussel. I collected altogether specimens of about ten kinds. Of the latter I will speak further when speaking of the Island of Tcheleken.

Taking a Turcoman "Lodka," or open sailing boat, without any deck, in the middle of which to make yourself comfortable, a tent or "kibitka," is pitched, and sailing due south, hugging the coast all the way, you arrive at a narrow strait between the main land and an island. Half way through this strait, and looking towards the former, is to be seen the mouth of the Amu Darya, or Oxus. On the opposite side of the strait is the Island of Tcheleken, somewhat what in the shape of a mushroom, with a small portion of the stalk facing the mainland. On the shores of the island, as you glide along the waters, are to be seen large flocks of the white swan; they are, however, very timid, and at near approach to them they immediately rise. It requires considerable dexterity on the part of the Turcomans to be able to make a good bag when out on a shooting expedition. Just at this point—that is at the centre of the stalk of the island—are very large deposits of salt, which is extracted in considerable quantities, the trade in which has grown to be very large, as many ships of 300 and 400 tons capacity lay in the roads constantly, the water being too shallow in that part to allow of their coming close in to be loaded off the shore. Boats carry the blocks of salt to the ships where they ride, and there load them which are bound to Resht and Asterabad in Persia, to Linkoran at the mouth of the Kura, running across the Caucasian Isthmus, Baku, Petrovsk, and lastly to Astrachan, for fish curing and domestic use on the Lower Volga.

To return to the Island of Tcheleken, which is 200 square miles in extent. On the south-west of the stem in the corner of the Bay of Kara-Gul, or Black Bay, there is an "aoul" or village of "khibitkas" or tents, much in the shape of a pound cake, formed of lattice for the perpendicular portion, and sticks springing therefrom to a wooden hoop at a sufficient height to form the ribs of the roof. The whole top and side is covered with felt; but the felt covering of one-half the hoop is drawn over or back, as the case may be, to let in light and air, and allow the smoke to escape, there is a door way, with generally a double door. The floor is the native ground covered with a coarse matting, over which are placed felt and other carpets. In the middle, or a little nearer the door, is the fire-place formed by four pieces of timber fastened together into a square frame, and placed on the ground, around which the inmates kneel; the fire being made from roots of a low scrubby thorn which grows to a considerable extent on the Desert, forming the largest portion of the island. The chief food is in the morning tea (without milk) and flat, whole meal bread, much the same as "Welsh Bakestone cake," really good. Middle day the housewife has made a pot of "Pillauf," composed of stewed wild duck, swan, or Beluga (a bottle-nosed whale), or other fish, and a large cauldron of beautifully boiled rice. To enjoy rice it must be boiled properly; the way they do it is into a cauldron, perfectly clean, placed over a wood fire is thrown

5 lbs. of clean rice (each household cleans its own rice), and just sufficient water to cover it, a wooden lid is put on, and allowed to boil, and continued to do so until the rice is nearly cooked, then the lid is taken off, and the excess of water allowed to boil and evaporate until the rise is done, when every grain separates, is soft, and nearly dry; it is then delicious. In serving dinner the lady of the house places all the rice in a heap on a large wooden trencher, placing all over it the stew of wild duck, &c., over which she pours about a pint of pure melted Khiva butter, placing the trencher on a crumb cloth on the carpet, when all the men part of the family sit around it, and set to, quite innocent of forks, knives, or spoons, with three fingers and thumb. After the meal is at an end the housewife hands round a varnished wooden bowl of water for each one to drink from, which is afterwards replaced by an empty bowl, each person placing his hand over it, the servant pouring over them warm water from a cast-iron jug (in shape like a coffee-pot), at the same time handing a towel round. Then tea is continuously served until bedtime; thus each day repeats itself all through the year. They never have animal food; one thing is it would be too expensive, as there is no grass, and the few sheep there are are kept as pets, the wool from which is woven into various fabrics for the households. The women do all the manufacturing, such as spinning, carding, weaving, and making felt and the different kind of carpets for which this island is famed. The women never eat in the presence of the men, and they are enveloped in a thin silk shawl, so that their faces are seldom visible. Referring to my remarks upon the shells found on the shores of the Caspian I noticed a remarkable fact—for several miles, a broad belt of a substance like thick felt carpet, and on close observation found it was composed of seaweed so fine that it looked more like hair, amongst which, thickly mixed and adhering to it, countless multitudes of infinitismal mussel-shells of a white colour on the shore high and dry, and some 50 yards from the water-mark, there is no tide. Another curious coincidence was the finding large quantities of cockle-shells, of such a size that I have never seen in Europe, and the largest specimens I collected I found in the Desert at a distance of not less than nine miles from the sea, and from their appearance they must be of very great age. I have specimens 1½ in. in length. This village contains upwards of 1500 Turcomans, whose chief business is that of fishing, shooting wild swan, and supplying their wants from the myriads of wild ducks and grebe that swarm on the bay, and extracting from under the ground and from the surface a valuable earth wax, called Neft-gil or Ozokerit, which they boil down to divest it of its earthy matter, after having mixed a certain proportion of petroleum to make it soft and ductile, and also to add weight. They sell it to the Khiva, Bokhara, and Persian merchants, who readily buy all that the Turcomans in their crude fashion extract. They are by no means energetic when working for themselves. When indisposed to dig for it they send a number of children from the village with donkeys and panniers to pick up all they find upon the surface of the ground and immediately under the sand. But this ozokerit extracting to be successful must be energetically and intelligently entered upon, and pits or shafts sunk as in Gallicia. If the enterprise is thus conducted it is of so profitable a nature that it cannot fail to be extremely remunerative. The demand for this material in London always far exceeds the supply. The ground in which the ozokerit is found on the island is covered with sand, varying from 3 to 4 in. to 1½ foot. The wax lies in veins running through the marl. On the outcrop the veins have a thickness varying from 1 to 7 in., and on sinking down on the course of the veins it considerably increases in thickness, and from this continual increase there is little doubt that at no very great depth a rich and thick bed of this material will be struck. I struck a vein occurring on the surface outcrop of 7 in. thick, and several others varying from 1 to 2½ in. in thickness, but the 7 in. vein was traced from the commencement of the outcrop halfway up the hill down to the plain more than 200 ft., where from the inclination it went under the surface of the plain it was opened sufficiently to sink a fathom on the vein. I found many veins at intervals of from 3 ft. to 1 fm. distance from each other, and varied from 1 to 3 in. in thickness, each of them increasing in thickness as they were sunk, from which I brought to London several hundredweights of earth wax which was extracted from the workings in my presence, and which I shall have pleasure in showing and giving all information to any capitalists who may have a wish to see it with a view to enter into arrangements for working the same. Some leases from the Turcomans (with approval of the Russian Government) of land on the island on which the ozokerit is found have been secured, and the contract is in London. Address at your office. VERITAS.

London, Sept. 18.

THE INDIAN GOLD MINING COMPANIES.

SIR,—I notice that the Devála-Moyar Company are selling a portion of their estates for the sum of 100,000*l.* to be worked by another company. I beg, therefore, to draw the attention of shareholders in the Indian Glenrock to the fact that this company has 3000 acres, or 1000 acres more than the Devála Moyar had before they sold the portion to this new company, and it is not at all improbable that the same thing may be done by the Glenrock directors, seeing that over such an enormous area it would be impossible almost to develope it by one company. If this property was in Australia the same extent of ground would most likely be worked by a large number of companies. The shares of the Indian Glenrock can still be bought for 30s. per shares. From the report published in last Saturday's Journal an entirely new reef 3 to 4 ft. wide has been struck in tunnelling the large reef. I have held shares in this company from its formation, and I hope present shareholders will hold on also and await results; I think we shall then be amply repaid for our patience. We appear to be on the eve of a great advance in Indian gold mining shares, and the information which Mr. Brough Smyth will impart at the Devála Moyar meeting next Tuesday no doubt will satisfy the most sanguine investor in these securities.—*Sept.* 21. SHAREHOLDER.

GOLD MINING ABROAD, AND IN THE DUTCH WEST INDIES.

SIR,—If your patience is not used up on the above subject, I should like to say a few words more to "An Old Subscriber." It seems to me that, if he had no wish to "worm" himself into such an undertaking as the Aruba Island Gold Mining Company, it would not need much "trying" to "worm" himself out of it, seeing he would incur no liability by so doing. Evidently your correspondent is not a member of the tri company, or he would not in such a manner attempt to depreciate the efforts of those who, having borne the brunt of the battle, are now trying to command success in the future where apparent failure has been the experience of the past, although that apparent failure has demonstrated to those interested that success awaits them provided they can extricate themselves from the difficulties in which they have been placed. According to "A Shareholder in the Company" I should hardly think that "An Old Subscriber" has been asked to contribute to the undertaking, and if not I think it would have been more to his credit to have advised his clients—if he has any—privately than to be ventilating his spleen in such a manner. Had he been a late employee discharged for incompetence, and without a character, he could have said no more. As for others having tried and failed, that is no reason why it should not succeed in the future when there is such abundant evidence of what is to be found there. "History repeats itself," and it may do here.

"An Old Subscriber's" statements do not speak much in favour of the honesty or competent management of the Messrs. Rule when contrasted with the report of Mr. B. F. Rule, printed in this company's original prospectus. In that report he stated that having been the superintendent of these mines for two years, he calculated that on working 29 of the principal veins whose width would average 12 ft., he could raise 715 tons of quartz per diem at a cost, including everything but milling, of 4*s.* 0½*d.* per ton. It is true he gave no definite amount of produce that might be expected from the same, but stated in that report that the return of 135 tons of unselected samples, forwarded for assay and treatment, might be taken as the basis on which to calculate the value of the ores which could be mined there, and the average assays of the samples from the 29 mines he mentioned, was far above the average of some mines which are now paying dividends. Yet "An Old Subscriber" says that these same parties gave this gold field a thorough practical trial. I leave your readers to draw their inferences, as comment is useless. Had I been either one or the other of the Messrs. Rule I should not thank "An Old Subscriber" for bringing my name into his letter. Your correspondent seems to "worm" or wriggle about considerably—for example, at one time it is a novelty to think of crushing quartz by wind power; at another time "it is improbable that they should do so, not but that the quantity of quartz is there, but because he thinks the quality is wanting. The assays of quartz sent to the mill appears to be quality enough, then having the two essential equivalents. All that is wanted to find the third is to extract it properly, and if that cannot be done there must be something wrong somewhere, and should be found out and made right.

If "An Old Subscriber" knows anything of gold mining, and has been through a well-regulated milling establishment, he would there find that gold saved from tailings is what the shareholders have to rely on for their dividends. In conclusion, let me tell "An Old Subscriber" that I think when anonymous correspondents use other peoples' names, unless they can prove it to be decidedly to their benefit, they had better content themselves with reading what other people write, and keep their pens dry, then they will do no harm to anyone. A GOLD MINING ENGINEER.

INDIAN GOLD MINES.

SIR,—It is gratifying to see some of your correspondents taking a proper position through the principal organ of the mining interest by giving the public a timely notice of their opinion respecting these concerns. It was with pleasure that I read the communication of Sept. 11, and I trust the subject will not be lost sight of. I would not have troubled your readers with this letter but for the strange remark in last week's Journal, that there had been an increased business in the shares of Indian companies owing to the communication in question, which dilated on their highly speculative character. As to business in the shares, it is well enough known how that may be done with a large number of Stock Exchange dealers interested in operations in gold mines, and who find Indian shares at present in favour with the public. Your correspondent happily draws attention to the great difference between the market value of these properties and that of other gold companies, which are in countries equally rich in the precious metal, and which are actually being worked at a profit, some even paying dividends. EDWARD G. FISHER.

Clarendon-street, S.W.

WYNAAD PERSEVERANCE ESTATE AND GOLD MINING COMPANY (LIMITED).

The following letter was published in the morning papers of Monday:—

SIR,—In the prospectus of the Wynaad Perseverance Estate and Gold Mining Company (Limited), as advertised in your columns, a portion of the property to be acquired by the company is represented as a lease from the Rajah of Nellumbore giving mining rights over 15 acres of the Perseverence Estate, and it is stated that "the Rajah binds himself to grant such further rights as may be required, if applied to within five years." Our clients, the directors of the Indian Gold Mines Company (Limited), established some time since for the working of the gold mines in this district, feel it due to their shareholders and the public to notify through you that they dispute the validity of the lease so alleged to be held, and claim that under a grant of prior date from the Rajah of Nellumbore the Indian Gold Mines Company (Limited) have a first right to work these mines, which claim our clients are prepared and intend to assert and insist on. These facts had, previous to the issue of the present prospectus, been communicated by us by letter to the directors and solicitors of the Wynaad Perseverance Estate and Gold Mining Company (Limited), in the hope that thereby the necessity for any such announcement as the present might have been avoided; but the claim of the Indian Gold Mines Company (Limited) being ignored, our clients have felt that they have no alternative but to instruct us to address you as we now do, and to request the favour of your giving it publicity in your money article. CLARKE, RAWLINS, AND CLARKE.

Gresham House, old Broad-Street Sept. 18.

The following letter is a forcible rejoinder to the preceding:—

SIR,—In reply to the letter of Messrs. Clarke, Rawlins, and Clarke, in the Money Market article of your issue of to-day, our clients, the vendors of the property agreed to be sold to the Wynaad Perseverance Estate and Gold Mining Company (Limited), desire us to say that their title to such property, which is granted direct from the Rajah, and has been registered in due form, has been carefully examined and reported on by competent lawyers in India, and that they intend forthwith to take proceedings against the authors of that letter for slander of their title. ASHURST, MORRIS, CRISP, AND CO.

Old Jewry, Sept. 20.

THE EMMA MINE.

SIR,—The directors of the above company submitted the audited accounts for the year ended December 31, 1878, at a general meeting held in December last, and Mr. Macdougall, who has been the director who has endeavoured to obtain justice for the shareholders, obtained judgment against Mr. Albert Grant for 108,188*l.* odd. The Master of the Rolls not long since gave judgment against Mr. Grant, and he is carrying the case to the House of Lords. Now, as a shareholder I wish to suggest to my brother-shareholders the importance of calling a general meeting without delay, in order that we may reorganise the company, and work the mine honestly. Let us, then, give up the expensive luxury of litigation, and endeavour to retrieve our past bad fortune. A SHAREHOLDER IN THE EMMA MINE.

Manchester, Sept. 21.

ISABELLE GOLD AND SILVER MINING COMPANY.

SIR,—Like your correspondent, writing in last week's Journal, I have been for some time past anxiously expecting to receive some information in regard to the 100 per cent. bonus promised to the shareholders. This was promised by the Patent Capsuling Company, which company I now hear is in course of liquidation. Cannot the directors be held responsible for such representations? If so, should not a committee be appointed to investigate and report upon this and other points vital to the existence of the company? If some such step is not taken, have we not great reason to fear that this, like its unfortunate predecessors, may prove "a delusion and a snare."

AN ANXIOUS SHAREHOLDER.

GOLD MINES AS AN INVESTMENT.

SIR,—Without wishing to depreciate the value of the Indian gold fields I would enjoin caution on investors lest the present *furore* should entail ultimate and serious loss to those who are now investing large sums in these schemes. To show the fluctuating quality of gold quartz I may mention that the Port Philip Gold Company (Australia) have recently had crushings from one of their lodes—the Old Man—and whilst one gave over 4 ozs. to the ton the next yielded but as many dwts., although now the lode is again improving. I merely mention this to show how necessary it is not to be led away by reports as to yields, which may only exist here and there at certain points.—*Hambleden, Bucks, Sept.* 22. INVESTOR.

NOUVEAU MONDE MINING COMPANY.

SIR,—It is to be hoped now that the Nouveau Monde shareholders are just about to reap the reward of their long suffering patience they will not be tempted into parting with their shares at the present low prices. Some months ago these shares rose to 2*l.* on the mere prospect of having a chance of purchasing the valuable property adjoining. It is well known that the appeal made for the necessary capital met with a very liberal response, no less than 70,000*l.* having been already subscribed for that purpose. With the negociations nearly completed, and in face of the recent welcome news from the mine it will be perfectly marvellous if holders permit any further depreciation in their shares, as if so they will very shortly make the bitter discovery that they have been playing into the pockets of London dealers.—*Huddersfield, Sept.* 20. K. O.

CEDAR CREEK MINING COMPANY.

SIR,—Can any of your numerous readers inform me what the directors of the Cedar Creek are doing to resuscitate the mine? I note it is in 34,433 shares, of 5*l.* each. If re-formed, why not make it 34,433 shares, of 2*l.* each, and allot to those shareholders who respond one new share for each old one held, and cancel all shares not taken up in this way.—*Portsmouth, Sept.* 20. A SHAREHOLDER.

THE NAVA DE JADRAQUE GOLD AND SILVER MINING COMPANY.

SIR,—My attention has been called to a letter from Mr. Houlston in last week's Journal. The delay in sending out the guaranteed dividends was simply caused by my unavoidable absence on the Continent on business of importance, and immediately on my return to London last Monday I lost no time in sending out the dividends—Mr. Houlston's among the number. Owing to the great pressure of extra work thrown upon the Spanish Government engineer, the demarcation of our property has been unavoidably delayed, and the directors intend shortly to publish a report. W. A WHITE, Sec.

London, Sept. 23.

POLLADRAS DOWNS.

SIR,—I do not know of any mine in Breage more worthy of ing reopened than Polladras Downs, which was last worked in connjnction with Wheal Vor by the Wheal Vor Company, which was dissolved in 1844. The last company, of 1851, did nothing in it. It yielded considerable returns up to its abandonment, which was some years before 1844. Tin was very low at the time—about, I think, 35*l.* per ton. The adjoining sett, a part of the same downs, and called Trueman's, is also well worthy the attention of speculators. It was, I find, worked by Wheal Vor as deep as a 50 fm. level, where a dam was constructed before the stoppage of Wheal Vor to keep back the water; and this is so strong that no pressure, consequent on the drainage of Trueman's, can break it. There have been several applications to the owner for a grant to work, but, for some reason, the working has not been resumed. I do not know whether it is under grant or not, but it is a good field for mining, and can be worked with a small capital. R. SYMONS.

Truro, Sept. 23.

TECHNICAL EDUCATION FOR MINERS.

SIR,—I read with great interest the article in the *Mining Journal* of Sept. 11 on Technical Education for Mines. You commenced by stating that "how to provide practical men with useful scientific instruction without at the same time making them useless as practical men is a problem than which there are probably few more difficult of a satisfactory solution," the truth of which I doubt not will be readily admitted. But what is the reason of the difficulty, how is it to be accounted for? It is not ordinarily difficult to educate persons of reasonable temperament and common sense facilities and parts. But it appears that such is denied to the present generation of mine managers—at least those of the British Isles.

Technical Education for Miners is a vague term, and may embrace almost the whole circle of the sciences. Is this what is intended—if not, how many of them? Why not furnish us with a definite curriculum of what we ought to know, aspire to, and be instructed in? Does not the difficulty referred to arise from the fact that the education said to be necessary is more of an imaginary than a really practical deficiency? else why is it that that which is said to be so imperatively necessary is allowed to stagnate from the want of a specific definition? It would seem to be assumed, and in certain influential quarters as well as amongst the more prejudiced illiterate, that the generality of mine managers in this country are lamentably ignorant of science, and of its application to the exigencies of mining in any of its phases. Who does the work then, and who could do it better? The difference it appears to me between practically educated miners and technically educated pretenders amounts to this—the former know how to do it, whilst the best of the latter are desirous to know having all to learn.

You have drawn a comparison between some celebrities of the past and the non-celebrities of the present age, all of the latter being included in this category, by no means flattering to us, but I am quite sure you will permit me to say that we entertain our own opinion on that subject, and would not mind discussing it but for the inevitable absence of the parties of the first part, and whose memories and fame we do not wish to disparage. None can deny but that practical science in its application to mining has made great strides during the past quarter of a century, and it would be most extraordinary if practical experience should have receded in a similar ratio during that period. Tell it not in Gath, we know better. When a superior class of mine managers are wanted they can be forthcoming. Some of them, crysalis-like, out of their present shells. It is not so much the fault of the men as of the system in which they are embarked.

Before censuring persons for being what they are, and what necessitous circumstances have made them, afford them an opportunity of being something better. I was reminded some time since in the columns of the *Mining Journal* by an ardent scribe with whom I had a controversy, that I was nothing but the servant of the company, which if applicable to me also applied to every other similarly situated agent throughout the country; but what did it, and what was it intended to imply—nay, more than imply—express by that person in that connection; at best it intended that I had no responsibility, but in the obedience and execution of orders. If that were so I could not be justly held accountable but for any departure or faithlessness from their fulfilment. As a servant, merely in the common acceptation of that term, I must receive my instructions to act from a master or superior officer. It is true as it respects mining, so far as its managers are concerned, that such instructions emanating from head-quarters can only be of a general character, unless when under exceptional conditions they are made special. There is a wide difference in the managerial responsibility under these two aspects, greater in the former than in the latter instance, as a much wider area of detail is personally involved. It would be interesting to know in what way, or to what extent inapplicable or inappropriate, technical knowledge can benefit or assist practical mining beyond that which is possessed by present practitioners. They may talk of geology, of chemistry, of mineralogy, &c., but the highest and most valuable science known to mining is mechanical philosophy. Geology, as a grand instructive and entertaining science, treating of the great epochs of past time, is too elaborate and comprehensive to guide the individual practical metalliferous miner in exploring his comparatively infinitessimal concession or grant comprised in a few square acres of ground.

The attainment of knowledge of various kinds cannot but endow the acquisitionists with power—moral and physical force; at the same time, it cannot be denied that the acquisition of knowledge in the abstract—that is to say, the knowledge of certain things which one has no means or opportunities of applying—cannot but be regarded as inutile, to retain which would be a prostitution of mental effort rather to be discouraged than commended. If I were an accomplished chemist to what extent would that assist me in my avocation as a practical mine manager in this country; and if I had studied chemistry sufficiently to become an adept in that science how much might it not have abridged my practical experience as a miner. In saying this I do not wish to be understood as excluding chemistry from the practical man's ambition. A knowledge of the blow-pipe and its various uses is in some countries almost invaluable, and should be learned and practiced here. In gold and silver regions its service is of inestimable value; but as so-called practicals know nothing of its use, I could give a different account of things. One is almost led to conclude that practical men in mining pursuits are governed exclusively by the "rule of the thumb," that they never theorised, read any books, or possessed any literary tastes.

Your statements on the authority of the last remaining animated vestige of the old school, as well as that relating "to the most competent Welsh or Cornish metalliferous miners when sent out to

gold mining district, or, indeed, to any foreign mining district, is as completely lost as the merest theorist," I purpose to reply to, with your permission, next week. ROBT. KNAPP.

Llanrwst Mine, Sept. 22.

SHROPSHIRE MINING.

SIR,—Your "Occasional Correspondent," writing on the group of Shropshire mines, very elaborately touched upon the mines now in operation, and as a visitor of the district it would have been more satisfactory if some one accustomed to the district had accompanied him in his tour, where some of the most important lands, as yet unexplored, could have been pointed out to him. True, the East Roman Gravels and the celebrated Roman Gravels are A 1 in the Shropshire group, and great praise is due to Captain Waters for his energy and ability in bringing these mines into such a successful state; and as your correspondent has given the readers of the Journal a picture of the hills, or part of the hills, in South Shropshire, allow me, as one interested in mining, to add a little to his information. Knowing the district in which the mines referred to are located, I may state that there is north of those now in operation a range of hills where all the lodes of East Roman Gravels and Roman Gravels traverse into, and can be found on surface. This range, in my opinion, is equal to the other ranges if operated upon, and will require but a small capital, combined with economy. To prove my assertion, and not take the time your correspondent assumes, the Roman Gravels has taken from the time of the Romans to bring the mine into what it now is, and as there are five well-defined lodes in this sett running north and south a cross-course would prove the whole when a shaft is sunk, and as this sett has been carefully inspected by mining agents well versed in mining, there opinions will bear me out in saying that the Roman boundary, north of Roman Gravels, will be second to none when explored.

Your "Occasional Correspondent," after giving us an outline of the western group, carries us back to the south-east, or Stiperstones range of hills, where he confines himself to four mines out of the many that are to be found in the Stiperstones range—Snailbeach, having paid dividends for more than 100 years, naturally cannot be expected to be as rich at all times, but I hear the manager of that celebrated old mine is now making preparations for driving a cross-course north of the old mine to intersect more lodes in the sett. This will prove some of the old miners' assertions, that a second Snailbeach will be found on what is called the Sandhole vein—every success to it. I am rather surprised your correspondent should travel so far as Tankerville from Snailbeach and leave out all the rest of the mines, but it appears a bird in hand is worth two in the bush with him; if the adventurers had been the same the riches would still have been hidden that are now in circulation. There is now in steady operation, known as the Venture Mine, now called Perkins Beach Mine; this has not been wrought upon, only tampered with, for several years for want of capital. Could the mining capitalist see with me it would not be so, for it is as well worthy a trial as the Tankerville lodes, which has produced so many hundred tons of lead ore this last 20 years or so; and as your writer states that the Stiperstones are the backbone of the minerals, surely the marrow will be found in the bone, as this mine is at the back. I shall leave this in the hands of others to criticise at their leisure.

A WORKING CAPTAIN.

BRITISH SILVER-LEAD MINES.

SIR,—This highly mineralised property is situated near Blaenau Festiniog Station, from whence a tramway passes close to the dressing-floors, thus affording every facility for inspection, and conveyance of ores from and materials to the mines. I have carefully examined the sett, which is extensive, and traversed throughout by very powerful, strongly mineralised, and well-defined lodes, with favourable underlie, embedded in the Llandilo Flags, a stratum that has not been known to fail in producing immense quantities of ore, and, therefore, there is every indication of opening out one of the richest mines in Wales. The workings are developing a very rich lode in the eastern shaft, and the stope going west has intersected a large body of ore gone down from surface, and will be continued under the trial pits that have proved good ore for several hundred yards further west, so that whether considered from a geological or physical point of view this property is so favourably situated as to leave nothing to be desired. The ore is rich in silver, can be dressed to 80 per cent. of metal, and will command a high price. The shares are 2*l.* each, and I can confidently recommend them as an investment, and not merely as a speculation. Investors desiring to visit the property, or requiring any further information, should apply at once, for, in my opinion, no time ought to be lost in securing an interest, as the mines are in such a state that large sales of ore can be made at a profit as soon as the dressing machinery is erected. JOHN L. M. FRASER,

Greenfield House, Wrexham. Consulting Mining Engineer.

COPPER MINES NEAR TAVISTOCK.

SIR,—I went to my broker some time ago, and told him that I thought of buying some mining shares. His reply was, "Before you put any money into a mine you had better go and see it." This seemed to me such practical advice that I acted upon it. The mines to which my attention had been drawn are in the neighbourhood of Tavistock. I, therefore, made Tavistock my headquarters. A coach leaves the Bedford Hotel at 3 P.M. for Liskeard, passing through Gunnislake. I was fortunate enough to secure a seat by the driver, whom I found very communicative, and one of the old school. The drive to Gunnislake is through four miles of hilly country. The scenery is very picturesque, and interesting from the number of mines in that locality. On the left, hidden from view, is Wheal Crebor, which is a valuable property, and I am told will one day be a great mine. We very soon came to the top of the ridge which overlooks the lovely valley through which flows the Tamar. On the opposite slope lies the village of Gunnislake, basking in the sun, beautiful as some of the Swiss villages which my countrymen have travelled so far to see this summer. To the right is the Great Devon Consols Mine, which is, indeed, a monarch of mines. We crossed the bridge, and ascended the hill to Gunnislake, where we put up at a good, old-fashioned roadside inn, kept by John Harvey, who, with his excellent wife, take you back in memory 50 years, before the days of express trains and limited liability hotels. Mine host and his wife are old-fashioned, homely people, who make you very comfortable in every way at old-fashioned charges.

After dinner I asked the landlord to favour me with his company, when I directed our conversation to the object of my visit to his neighbourhood. At the mention of mining his eyes began to twinkle, and I saw that the conversation was likely to become mutually interesting. I found that he is a shareholder in most of the good rising mines in that locality, such as Gunnislake (Clitters), Wheal Russell, and one or two others which are principally held by residents in the neighbourhood, and are not subject to market operations. I got a good deal of useful information about these mines, which I determined to visit on the following day with my son, who knows something of geology and minerals, in order that we might judge for ourselves. We drove first to the Prince of Wales Mine, where we saw Captain Andrews, who is a man of great ability. He spoke in high terms of his mine, which he is exerting every effort to bring forward without loss of time. It appears that this mine, on a very small outlay, a few years ago returned copper ore of the value of 54,873*l.*, and paid 6720*l.* in dividends. When mining ceased to pay it was no longer worked, and the bottom of the mine has ever since been under water. A larger engine has been erected under Captain Andrews' superintendence, and in ten days he expects that the mine will be emptied of water, when they expect to come upon a rich lode of copper ore. I was told that three years ago, when the 77 was being driven west, it intersected the cross-course, and the water coming from the end was so strongly charged with copper that the iron rails in that level were completely plated with copper—so much so that they looked more like copper than iron rails, and it was the firm opinion of the agent that the water was coming from a large deposit of copper. The water was springing up from the bottom of the end, and they could not drive further until the 90 was extended. It is expected in the course of a few days that the 90 will be drained, which will be then driven westward with all speed, and it is generally believed will lay open a large and rich course of ore.

I need scarcely add that on this information I bought some shares in the Prince of Wales, which were then selling at 20s., and I am not surprised to see that they have since risen in value. I also visited the Gunnislake Mine and Old Gunnislake, which was a mine of wealth to the Williams family years ago, and is likely again to benefit its shareholders. My son went underground with the Captain, but I must reserve my account of these mines for another letter. I will only add that I am well satisfied with my visit to Gunnislake, and I would advise anyone who thinks of putting money into mines to do as I have done—to go and see them.

A PRACTICAL MAN.

MINING IN MONTGOMERYSHIRE.

SIR,—Following on my course westward from Cwm Hafod-y-Merch, we come to Cwmbyr Mine, which up to a recent date was worked by a London company, but did not prove very successful, as they never erected machinery there of sufficient power to cope with the common enemy (water), which in this mine appears to be very strong. Large quantities of lead and blende have been sold from here from time to time, more especially the latter, but which, I hear, is gradually giving way in their lowest levels to the more precious mineral, lead; and, considering the altitude of the hill from which operations have been commenced, they are yet but at a very shallow depth in comparison to other mines in the district, and I have no doubt that as they continue to deepen this mine into the table land of the country their large courses of blende will altogether give way to lead, which will prove a most gratifying change to the local parties who have recently taken it up, and are now engaged in erecting the necessary machinery to meet their requirements; and, acting upon a lesson taught them by the misfortunes of their predecessors, they will soon place the mine in a very favourable position, and be doubly repaid for the pluck and energy displayed by them in very trying times to lead miners.

To the west, again, and adjoining, is the Hyddgen Mine, where a large amount of money has been spent by a private capitalist with very poor success as far as the discovery of ore is concerned. It was reported when operations were commenced here by him that they had the celebrated Dyliffe lode traversing their sett, and that their operations were to be solely confined to its development; but, judging from the character of the lodestuff brought to surface, I can neves persuade myself that it was taken out of the Dyliffe lode proper, ar it does not bear the least semblance to it as developed in any other mines opened on its course in the district; and I would strongly advise the expenditure of a few pounds in costeaning south of their present line of operations to search for something more congenial to the existence of lead than anything they have yet discovered there in their present working. This is the most westerly mine on this line in the county of Montgomery, and being just on the borders of Cardigan I cannot resist the temptation to go into it and have a peep at a new mine recently taken up by a few private individuals, called Nywydd Lloyd. I did not go underground, but judging from the specimen of lead and lode brought to surface from the different points of operation underground, I think they may be congratulated upon having a most promising sett—in fact, such a sight as I saw here, with seemingly a small outlay, is but very seldom to be met with; and another thing much in its favour is that it will not be an expensive mine to work, and the carriage of ore and materials will be but trifling, as they are within, I should think, two miles of the Glandovey Railway station of the Cambrian Railway. I sincerely wish this new undertaking a prosperous future. MINER.

Sept. 21.

MINING—PRACTICAL AND THEORETICAL.

SIR,—I noticed in last week's Journal a letter, the writer of which signs himself "A Practical Miner." He appears to be boiling over with indignation and wrath against mining schools in general, probably because he, poor man, has never experienced their great advantage. He is evidently a man whose very flesh creeps and whose very hair stands on end at the name of "theory," who has not the crudest notion of the harmonious combination of theory and practice, and who in a word deems that mining must be entirely practical, or nothing. In this letter I shall confine myself to the main attack of your correspondent, although at the close of his letter there is what was probably intended to be a brilliant tirade against that "abominable stuff," detonators, and the unhappy members of the Miners' Association of Devon and Cornwall. Detonators will probably still continue to be used, and the members of the above association will doubtless still breathe freely, notwithstanding the explosive nature of "A Practical Miner's" remarks. Every man of sense must admit that theory is incomplete without practice, and practice equally, if not more so, without theory. In fact, theory without practice may be compared to a weapon without an arm to wield it, and practice without theory to an arm ready to wield, but without a weapon. Lecturers on mining never intend that their discourses should be all that a student needs who intends to make mining his profession; they intend that their lectures should be supplemented by practice. It is clear that the necessary practice can easily be obtained in mining schools situated in mining districts, and in such districts practical mining usually, if not universally, forms part of the curriculum.

The Royal School of Mines, being situated in London, cannot teach its students practical mining without very greatly increasing the cost of training; they must obtain that knowledge during the vacation, or after they have gained their diplomas. The school does all it can by thoroughly grinding the students in all the sciences in which mining proper is built, by providing a most able lecturer on the subject, and by exhibiting numerous minerals from all parts of the inhabited globe, and many models of mines and mining machinery. When the student leaves the school he has attained such a thorough grasp of the principles of mining, and of the details of the machinery connected therewith, that a fair proportion of practical knowledge makes him competent to manage any mines in the world. He has no local prejudices, nor—worst of all—the prejudice of ignorance. It is not necessary for him to grope all his life "in the bowels of the earth." If he is not the dullest of mortals he will soon acquire the use of the pick. Enthusiasm and patience are his best teachers in the use of this tool. After a time—I speak from practical experience—he will be able to feel, as it were, the hardness of different kinds of rock, and know at once from its use the cost per fathom of driving such rock. If he is in the smallest degree an observer by studying the changes of a lode from day to day, he will learn more of the real nature of lodes in a couple of years than most practical miners learn in a lifetime. The knowledge of the proper use of the dial will enable him to avoid some of the atrocious blunders into which some practical miners steer. I have known a practical miner drive a cross-cut from a certain level to meet a lode which he "supposed" was to the north of him when if he had carefully surveyed the surface of the ground above him he would have discovered that this lode was exactly in the opposite direction. I have known others to dig trenches and sink several costeaning pits on what they supposed was the back of a lode, and have even gone so far as to give the lode "a local habitation and a name" in their plans, when the slightest knowledge of geology and mineralogy would very soon have convinced them that there was not even the slightest trace of a lode there.

Mining has suffered little if at all from mining students, who, as a rule, take a pride in their profession, and who endeavour all they can to raise its tone; but mining has suffered terribly from ignorant, bigoted, and unprincipled men who are pleased to call themselves "practical," and whose chief occupation is telling lies and pocketing fees. Such men may form but a small section of practical miners, as I trust they do, but they are, nevertheless, a very powerful section for evil, and have done more to debase mines and mining than the blunders of a million directors. But there are many men, essentially practical, who can "look the whole world in the face," for they are honest and straightforwar l. It is a pleasure to know such men, for they are ever eager to learn the sciences that lie at the root of mining, and are quite as ready to impart their practical experience, which is often very great, to others. But if men, who, though honest, no doubt, and otherwise estimable, close their eyes to any and every kind of knowledge that is gained by books and oral teaching it will soon be said, "Othello's occupation 's gone!"

E. HALSE, A.R.S.M

THE POLGOOTH MINING DISTRICT.

SIR,—Your esteemed correspondent, Mr. R. Symons, of Truro, now he has said a few words about South Polgooth may, perhaps, be good enough to do the same about West Polgooth. I suppose they are not one and the same. I understand that very few shares are placed in either, especially in West Polgooth, but that they are good speculations. We only hear of them occasionally. I think West Polgooth is in Sticker parish, but how far or near St. Austell this is I know not.

Sept. 20. TIN ORE.

EAST WHEAL ROSE.

SIR,—Since I sent to the Journal a short letter on the Newlyn Mining District I have gathered from mine agents and others all particulars respecting East Wheal Rose, from which it appears that the mine was not stopped from any failure in the lodes, but from misdirected operations. I intend to send for next week's Journal those particulars, from which it will be obvious that the mine is good—indeed, the best in the county now unwrought. I am pleased to find that several applications have been made to the lord for a lease of the mine, and that to one of the applicants a lease is being prepared by Mr. Chilcott, the legal agent of the proprietor, Mr. C. H. T. Hawkins.

Truro, Sept. 23. R. SYMONS.

P.S.—The re-opening of East Wheal Rose will doubtless lead to the working of several other mines in the district which have been very slightly tried, but which showed when worked all the indications favourable for the production of lead.

BREAGE AS A TIN MINING DISTRICT.

SIR,—It appears that capitalists have for a long time forgotten this valuable district, this parish as a tin producing one being second to none in the county. There is but little going on here at present in mining, although there are so many valuable lodes with nothing done in them below adit. Old Vor is worked 296 fms. below adit and raised enormous quantities of tin. Wheal Metal, south of Old Vor, gave great profits to the adventurers. Wheal Fortune, also south of Old Vor, 96 fms. below adit, only sunk 10 or 15 fms. in the last working, raised 1300 tons of tin. Polladras Mine, north of Old Vor, I think 110 fms. below adit, also gave great profits. Godolphin Mine, also north, some parts of the mine only 30 fms. below adit; I think the deepest point is 100 fms., this gave great profits. All the lodes of the above-named mines are parallel to each other, and in the same rich channel of ground, with several cross-lodes and flookans forming junctions with the east and west; similar intersections always prove of very great importance, and in the above mines made large deposits of tin, enabling them to make the immense returns they did.

Between these mines are several parallel lodes in virgin ground that have only been tested at several points on the backs at very shallow depths, and to the adit level by the ancients, but nothing done below. There are five or six lodes to the north of Old Vor and adjoining that rich old mine known when last worked by the name of Truman's, in nearly whole ground, well worthy of attention. I have not the least doubt that this mine, on being re-started, will turn out a great success, for the lode Truman's is only worked on a little below adit; 50 or 60 fms. in one shaft alone produced from 10,000*l.* to 12,000*l.* worth of tin, sufficient to pay dividends. The suspension of Old Vor was the cause of this mine being abandoned with good bunches of tin in sight. I know of no better prospect in this locality. There are the Old Vor, Wheal Metal, and Wheal Fortune to the south with Polladras and Godolphin to the north; all have been rich mines, and Truman's is in between them. I hear this mine is to be worked under the name of North Wheal Vor, and that operations will be in a short time commenced. I wish the company every success. The fact is they cannot fail to obtain it, as their mine was a dividend-paying one when suspended; this obtained from working on one lode only, whilst there are four or five others, and these latter very likely to be equally as rich for tin as Truman's lode was and is. There are several other good setts in this parish that can be highly recommended, especially Wheal Wallis, which I hear is also secured, and I should like to see some others also taken up, as I firmly believe whoever does secure them will be well paid for any outlay, and never regret investing money in this parish. I write from experience, knowing these mines, especially Truman's, having resided in this district for many years. With your kind permission I may say a few words on Polladras and Wheal Wallis in another letter.

Sept. 21. A BREAGE MINER

BWLCH UNITED MINE

SIR,—There has been a great deal written in the Journal about this no doubt very valuable property and its great prospects, all of which I quite believe in; but I think I may be pardoned for remarking that there appears to be a diffidence on the part of the management of the mine to making known, as fully as I believe is desireable in the interests of the shareholders, the exact state of affairs on the property. According to the published reports, dressing has been going on for several weeks, and so far no light has been thrown on any prospective result. Why cannot Capt. Bray be induced to become a little more explicit, and frankly state when he expects to make a sale of lead, and give an estimate of the quantity? By reticence on his part he permits suspicions and rumours of all kinds to arise, and the shares to be depreciated in value, while when these are refuted by actual results the world says the information was withheld on purpose, in order to buy up the shares cheap; thus a thoroughly good enterprize becomes apparently tainted with market trickery, and even others connected with it, but wholly innocent, catch the spray of the tar brush. With so fine and prosperous a property as Bwlch, it should, like Cæsar's wife, be above suspicion; and I trust my remarks may be accepted in the spirit in which they are written, in the interests of one of the finest and most legitimate mining enterprises of the day.

London, Sept. 17. A SHAREHOLDER.

[For remainder of Original Correspondence see this day's Journal.]

SEPARATING ORES.—In treating magnetic and non-magnetic substances in a fine state of division, it is found that some portion of the non-magnetic substance adheres under the attraction of the magnetic substances to the magnetic wheel or magnetic machine employed, and a perfect separation cannot be obtained. In order to obviate this, Mr. F. J. KING, of Bishopsgate Avenue, first passes the material to be operated on over the poles of magnets, either permanent or electro magnets, with a piece of thin non-magnetic material, such, for example, as brass or zinc, separating the material from the magnets. On imparting to this non-magnetic material a motion, reciprocating or otherwise, over the poles of the magnets or magnetic bars, all the magnetic particles in the mixed ore or material are turned over as they pass each pole, and the non-magnetic material passes through to the bottom, leaving the magnetic portion on the surface ready for separation by a magnetic wheel, which consists of a periphery or circumference composed of bars of iron or steel, placed at a suitable distance apart parallel with the centre line or axis, and attached to a framework of brass or other non-magnetic material mounted on a shaft, to which rotary motion is imparted. The cross-bars are made magnetic by contact with the poles of any convenient number of magnets, which are arranged in such a manner that the bars form alternately north and south poles. During the rotation of the wheel, the magnetic substances previously brought to the surface in the manner hereinbefore described are attracted and carried up by the wheel to be brushed off or removed into a suitable receptacle, the non-magnetic substance being discharged direct without coming into contact with the wheel.

PERPETUAL MOTION ECLIPSED—COLD AIR MOTOR.—An invention is described by the Herald as being in operation in New Street, New York, which consists of an attachment very much like a common air-pump by which cold air is forced by the engine into the steam cylinder. The increase in the number of revolutions per minute of the fly-wheel, when this apparatus is applied, over the number it is able to make when the engine is run by steam alone, seems to indicate a great gain in power. A 10 horse-power stationary engine is used to exhibit the appliance. The exhibitors claim that with this invention they can do 10 per cent. more work on 30 per cent. less coal, or in other words, that its use will effect a net saving of 37 per cent. in the

cost of running an ordinary engine. It is stated that by adding the apparatus—all other conditions being equal—20,793 instead of 18,688 revolutions were made with about two-thirds the coal.

REPORT FROM CORNWALL.

Sept. 23.—There are two very different ways of regarding the proceedings at the Dolcoath account. We do not mean so far as the actual working of the mine is concerned, or its result in the shape of dividends, for if they nre not satisfactory they ought to be, and ought to admit of no question. Indeed, we quite agree with Capt. Josiah Thomas (whom everybody was glad to see about again after his recent illness) that considering the mine has had one shaft idle out of four for ten weeks, Dolcoath has done wonderfully well. Equally satisfactory, too, is it that the stacked tin has been disposed of, and that besides having paid away 15,000*l.* in dividends since the commencement of the year, a debit banker's balance of 6000*l.* has been converted into a banker's credit balance of 4500*l.* These are figures to which we may very well call the attention of those who yet profess to believe in the decadence of Cornish mining, and of which any management may well be proud. But we cannot regard the rest of the proceedings with anything like equal satisfaction. We are just now coming as a nation to understand that it is not the business—or, indeed, the right—of the agricultural landlord to treat his tenant farmer as a child in leading strings, and to bind him down hand and foot in the conduct of his business. It is singular, and not at all pleasant or satisfactory, that at such a juncture we should find this same sort of thing repeated in an exaggerated form between a mineral lord and his tenants, and that Dolcoath, of all mines in the world, should be selected for this interference. We are quite ready to grant that while it is essential that a farm should be managed on principles of good husbandry, it is equally essential that a mine should be worked in a workman-like manner, and that the end in both cases should be to maintain the greatest amount of productiveness for the longest period; and that this, in some way or other, the lord, be he land or mineral, has a right to secure, though we may differ about the policy of different methods.

Here, however, we stop. We utterly repudiate the idea that the ordinary landlord has any right to dictate to his farmer tenant the way in which he shall sell his produce, or that the mineral lord has the slightest right to interfere with his adventurers in the sale of their ore. We are quite ready to admit a closer connection in the latter case than in the former, because dues are proportionate on proceeds; but where the interest of the lord and the adventurers are absolutely identical, as on this point they are, we believe the adventurers may well be trusted to look after them without any meddlesome interference, and that they are quite as likely to know the way to conduct their own business as this lord or his steward. We speak plainly upon this subject, because we believe it to be an important one. The other day "ticketing" was the nostrum recommended, but that has proved the miserable failure we always predicted. What the next idea may be we know not, but it does not seem likely to be a recommendation to the mine to do its own smelting, coupled with assistance to help it to put up the necessary plant. That would be a move in advance, but even if that were taken it would not justify any interference with the adventurers in the matter of sales.

There is, however, a satisfactory side to even this portion of the proceedings in the statement of Mr. Bolden, that Mr. Basset will not take more than one-twentieth dues, except when the adventurers receive more than four times as much as himself. Now, in the present altered condition of mining, and the heavy charges thrown upon adventurers as compared with days when mines were shallow and expenses light, we regard one-twentieth dues as unduly heavy, and one-fifteenth as simply preposterous, and what we are glad to see in this statement of Mr. Bolden is the first attempt that has been made, so far as we are aware, to proportion dues to profit. It is only a very partial idea, but it is the thin edge of the wedge, and we are not without hope it may lead to great results.

We have argued again an again that the only righteous way in which respective shares in a mine of the lord and the adventurers can be apportioned is by assessing dues on profits, with dead rent for land occupied and damaged. We have shown that unless the mineral under an estate can be raised at a profit it has no commercial value, and has, therefore, no property which the owner of the soil can deal with. We have pointed out that under the present system all the risk is thrown on the adventurers, and that the lord who does nothing and risks nothing may yet realise largely out of the losses of his tenants—very much on the "heads I win, tails you lose" system. We have directed attention to the fact that the attempt to meet this by a reduction of apportionment of dues during pleasure is alike a clumsy and an uncertain expedient. Now at length we do have the principle for which we have so long contended recognised, however imperfectly. We do not despair that it will, slowly no doubt, but steadily, make way; but we shall never reap its due advantage until it is carried out in its integrity.

By the way, the past week ought to be regarded with peculiar interest in mining circles, for if we mistake not we shall have to go back a good many years before it can be paralleled in the number of dividend meetings. Wheal Kitty, Blue Hills, and Penhalls on Friday —2s. 6d., 2s., and 2s. respectively; Dolcoath on Monday, with 1*l.*; and Wheal Peevor on Tuesday, with 1*l.* 2s. 6d.—five dividends in five days. Add to this that Cook's Kitchen made a better report than that once prosperous old mine has made for years; and there is a very substantial set off against the unfortunate position of affairs at West Frances, where, without any actual deterioration in the value of their property, the adventurers unexpectedly find themselves face to face with a loss of 1100*l.* That this should mainly have arisen from the want of ventilation, preventing the stoping in a productive part of the mine, is a curious, and should be an instructive, incident. If boring machines are to be any good they must be efficiently worked.

REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

Sept. 23.—I do not know where "Barytes" has learned his geology, but if he will consult any ordinary geological text-book, or if he would prefer the more elaborate works of Sedgwick, Murchison, and the "Memoirs of the Geological Survey of Great Britain," he will find that, while the average thickness of the Llandeilo beds is not 1200 ft., but 3000 ft.; they often attain the thickness of 10,000 to 12,000 ft. If, further, he will take the trouble to follow these beds from the side of the Corndon greenstone westward to the Wotherton Mine, he will find that, allowing for the dip of the strata, there is a thickness of about 8000 ft., the uppermost portion of which belongs to the Bala beds, in which that mine is worked, the remaining strata being the continuation of those which on the eastern side of the Corndon form the metalliferous strata of the shelve district. On his own showing, the mines worked in these strata, which contain both lead and barytes, do not contain them together—more barytes, less lead ore, and *vice versa*, the conditions being favourable. And, further, he shows that it is in the uppermost beds of the mines, where the strata are passing up into the Bala group, where barytes is most plentiful. I, therefore, think that I am justified in my statement that, except at a great depth, the mine referred to cannot be expected to become a profitable lead mine.

The great interest taken in the mines of Cardiganshire is evidenced by the numerous letters which have of late appeared in the Journal concerning them. Let me just advise "Rusticus," who wishes to be informed of the history of the Cardiganshire mines previous to the present century, to refer to the "Notices of the History of the Lead Mines of Cardiganshire," by Robert Hunt, in the Memoirs of the Geological Survey of Great Britain, Vol. II. part 2. And "Nemo" might peruse with advantage "The Mining District of Cardiganshire," by Warrington W. Smyth, in the volume. The same correspondent might also, with a view to the question of depth at which the mines of the country may be profitably worked, find some information in Mr. D. C. Davies' book on "Metalliferous Minerals and Mining," page 207. Then, lastly, Edward Bevan should not make so many "green" puns, and he might wisely reserve some of his sawing until he is well out of the wood.

I am pleased to announce an important discovery of lead ore in one of the shafts now working at the Cambrian Mines.

For the first time for many years the Snailbeach Mine does not stand at the head of the mines in Shropshire selling ore. In quantity, and apparently in quality, the first place is now occupied by the Roman Gravels. But, perhaps, this is only because the Snailbeach management has not thought it advisable to sell so much ore at the low rates so long prevailing,

The colliery known as the Hafod-y-Bach Colliery, near Ruabon, has undergone a change of management, and the new company are making extensive arrangements and facilities for a greatly increased output. By-the-way, this is the deepest shaft in North Wales, being about 630 yards deep. Great difficulties were encountered and overcome when the shaft was being sunk, owing principally to a thick bed of wet and almost fluid sand having been met with, which after causing much trouble was, however, finally overcome by "tubbing" the pit.

THE TRADE OF THE TYNE AND WEAR.

Sept. 22.—The coal trade has been much retarded during the week owing to a heavy storm in the North Sea, and the arrivals and sailing of vessels have been comparatively small. Shipments are, however, now proceeding briskly. Some contracts have been made for gas and manufacturing coal for next year, but as a rule coal fitters are not disposed to enter into contracts for forward delivery at present rates, which continue low. The steam coal trade is quiet, but pretty firm, and most of the works in Northumberland are fairly employed. In South Durham it is considered that there is a fair prospect for work at the pits during the winter. At East Howle coal is now drawn from the new shaft, and there are reports that the Coxhoe Collieries will shortly be reopened. The collieries and ironworks in the Spennemore district are doing exceedingly well. In the "Mineral Statistics" of Mr. R. Hunt, just issued, there is published a return of the railway distribution of coal, the part relating to the northern coal field has great interest. The Northumberland and Durham mines have yielded nearly 30,000,000 tons; out of this over 9,000,000 tons were carried on the North-Eastern Railway. For local consumption and land sales 4,847,681 tons of coals were carried to places between Berwick, Tebay, Leeds, and Doncaster. And of coke there was carried to points in the same area, and for use locally, 2,133,212 tons. Of coal passing over the railway beyond these points there was carried 428,544 tons, whilst of coke there was carried 1,349,892 tons. The latter quantity includes the coke carried to West Coast blast-furnaces, and indicates the trade done in coke between Durham and West Cumberland. The North-Eastern Railway used 552,254 tons of northern coal and 8642 tons of coke. The total quantity of coal carried over the North-Eastern Railway was only 475,000 tons less than the previous year.

The iron trade continues quiet, and prices are very low. At the Consett Iron Company annual meeting a dividend at the rate of 20 per cent. for the past year was declared. The Chairman (Mr. Henderson, of Durham) pointed to the fact that this was the largest dividend declared by any similar company for the year, and added that it was due to the manufacture of coke and iron, the coal worked yielding a very small profit. The iron-plate mills have produced 1600 tons weekly, and there is an ample demand. Steel-plates are also to be made shortly. The price of coke has fluctuated more during the past than in any previous year.

The Highland Railway Company have concluded a contract with the Moss Bay Iron Company, Cumberland, for 6000 tons of steel rails at 6*l.* 2s. 6d. per ton, and the same company have contracted for 2400 tons of railway chairs with Messrs. Head and Co., of Stockton. Messrs. Krupp, Germany, tended for these contracts.

At Middlesborough, on Tuesday, the Pig-Iron Trade was in a very depressed condition, with lower rates. There was a fair attendance, but a very languid feeling; but when the report was received from Scotland there was a better feeling. The quotations for No. 3 was 38s. 6d., with fewer sellers. Makers ask more. Warrants are 40s. for No. 3. The stock of warrants is larger; Connal holds 94,000 tons. The shipments of pig-iron have been scarcely up tc the average. It is expected that there will be a large trade with America this autumn. The steel trade is likely to be augmented by new works at Middlesborough, to be erected by a Sheffield firm. The Erimus Steelworks are being rapidly pushed forward, and also the extensions at Eston. The Darlington Iron Company are engaged in the manufacture of light and heavy rails, and especially tramway rails in steel. The iron shipbuilding trade is very active, and as ships are launched in the Tyne, Wear, and Tees others are laid down in their places. Most of the large engineering works are also well employed in marine and lecomotive work. The foundry trade is fairly employed. The tendency of prices for finished iron, as well as pig metal, has been downward. Bars are 5*l.* 10s.; ship-plates, 6*l.* 10s.; puddled bars, 3*l.* 12s. 6d. to 3*l.* 15s. Coal and coke tendency lower.

The Bessemer Steel Works of the Darlington Iron Company (Limited) since they commenced operations have been working most satisfactorily, the company having had a good stock of orders in hand for heavy and also light rails both on home and foreign account. The company's operations include to a large extent the production of tramway rails, of which they are making, we understand, a speciality. Though only engaged as yet but a short time in this industry, the company's operations may be judged of when it is stated that tramway rails have been supplied for laying down at Manchester, York, Sunderland, Bath, Blackburn, Leeds, &c. The company, which took no secondary position in the past for the extent and quality of its iron rail manufacture, gives fair promise from what has been stated to be well to the front in what has practically superseded iron for rails steel

The directors of Palmer's Shipbuilding and Iron Company (Limited), Jarrow-on-Tyne, report that their net profits for the year amount to 56,565*l.* 11s. 5d., and, including 1035*l.* 16s. 1d. brought forward from the previous year, make an available balance of 57,601*l.* 7s. 6d. Out of this amount the directors propose to write off 9000*l.* against new works and carry 12,000*l.* to the reserve fund, which will then amount to 32,000*l.* and to pay a dividend at the rate of 4 per cent. per annum, requiring 36,035*l.* 4s., and leaving 566*l.* 3s. 6d. to be carried forward to the next account. The works continue to be fully employed, and contracts have been entered into which will keep them in active operation for several months.

THE SEAHAM COLLIERY EXPLOSION.—Considerable progress has now been made in reopening these extensive works. The bodies found first in the main roads near the shaft, and near the points where the main roads branch from, were much burnt, and mutilated beyond all precedent, showing that the explosion had passed with terrific violence at these points, and expended itself up the shafts. Very heavy falls obstructed the roads into the Hutton and Maudlin seams, and when these were removed in the Hutton seam the men were found to have been killed by the after-damp, and not burnt. Here four men were found, and a chalk inscription as follows, written on a piece of deal: "Lived until five in the morning," and their names—Jacob Fletcher, Jno. Riley, Richard Drainer, — M'Lachlan." The whole of the No. 1 Hutton seam had been explored by Monday, and the bodies recovered, when the exploration of the Maudlin seam was commenced. Very heavy falls have occurred here, and the work of exploring and reopening will be difficult and will occupy some time, but generally the difficulties met with from foul air are disappearing, the ventilation having been much improved by putting a heavy waterfall in the downcast shaft and a steam jet in the upcast shaft. A consultation of mining engineers has taken place, and the first step for getting the pit into working order carried out by relighting the furnace in the Hutton seam. The Home Secretary has written to Mr. Burt, M.P., to explain that his letter to Lord Castlereagh was one of sympathy with all who had suffered. He expressed no opinion which should in any way prejudice the question of responsibility for the explosion. He would be wholly guided by the result of the coroner's inquest, at which the Home Office would be represented by counsel. Sir Wm. Harcourt adds that before next session he hopes to confer with Mr. Burt in order to consider whether further legislative securities are possible for diminishing the risks which have recently proved so fatal.

The occurrence of this explosion will certainly draw attention to the question of working large areas of coal with only two shafts. At present very large areas are worked by two shafts. In some cases the workings extend to a distance direct from the shafts of upwards of four miles. The great cost of sinking such shafts as are met with on the Durham coast, upwards of 300 fms. in depth, is of course urged against sinking additional shafts. When the Monkwearmouth, Seaham, and other shafts were put down the cost was very heavy, and the difficulties met with were almost insurmountable in the old system of sinking, but great improvements have been discovered since that period in the mode of sinking, and it may be worth discussing at present whether it would not increase the safety of coal working, and at the same time be more economical, to provide additional air shafts at a distance from the coal drawing shafts and plant.

The Chaudron system of sinking through sand and large feeders of water has been tested at Marsden, and proved to be quite successful, thus preventing the necessity of lifting the water met with. It is proved that shafts can be sunk by this system, and the cost as compared with the old system will be very much reduced. As to the increased facility for ventilation, and consequent increased safety, there can be no doubt, if more shafts were provided. The question of increased economy in working costs, so as to recoup the cost of sinking those shafts, is a very important one. It is evident that the great extension of the workings to from three to four miles increases the cost of making and maintaining roadways and airways, and of haulage, to an enormous extent, and additional shafts would greatly reduce those costs. A large number of men are constantly required to keep the roadways and airways in those mines, and if it were possible to reduce materially the length of those roadways a considerable reduction would be effected in this part of the working staff, and a consequent reduction in the costs of raising coal.

Attention will also be drawn there is little doubt to the question of furnace and mechanical ventilation. Most of the deep shafts on this coast are ventilated by furnace power placed at the bottom of the shaft, and they are well ventilated. In shafts 200 fathoms and upwards furnace ventilation is, perhaps, more powerful than fan ventilation, but there is always a certain amount of danger from furnaces underground, the coal and shale sometimes is ignited from those fires, and when an explosion occurs a mechanical ventilator placed at the surface possesses many advantages. The fan in this case is not at all injured as in most cases, and the ventilation is, of course, soon restored if at all disturbed, and, consequently, the exploration of the mine and the rescue of the men who have escaped is greatly facilitated. From these considerations it will scarcely be disputed that mechanical ventilation with the power placed at the top of the upcast possesses under certain circumstances very great advantages as compared with furnace power placed at the bottom of the shaft.

REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

Sept. 23.—Upon 'Change in Birmingham to-day, and in Wolverhampton yesterday, the two successive drops in the Middlesborough market had a depressing effect. In cases in which negociation had been begun a week or two ago, and which seemed likely to be concluded to-day, there was a manifest reluctance on the part of buyers to proceed any further. Alike, therefore, in crude and in finished iron, as well as in ore and fuel, the market was over supplied, and in other than in few instances the tendency was towards improvement. Pig-iron makers were not so successful as has been the case in late previous weeks. High-class Derbyshire qualities are in request, and agents reported some good sales off market. For Northampton pigs there is an improved enquiry. Common pigs were offered more freely than last week at 2*l.*, and they might have been bought at a trifle less money. Marked iron makers expressed difficulty in disposing of their iron at the standard price of 8*l.*, the consumption just now running mainly upon the unbranded iron, which is being rolled by the marked iron firms. Common bars were easy at a shade over 6*l.* Much speculation was indulged in as to what wages will prevail in the quarter ending Christmas as the result oi the accountants' examination of the books of the 12 selected firms under the sliding scale which regulates wages. This examination is now being conducted, and the result will be made known on the 29th inst. Coal and coke are not in abundant request, and prices do not stiffen very perceptibly.

It is understood that the bulk of the proposed issue of preference shares by the Hamstead Colliery Company (Limited) has already been taken up by the old shareholders, and that a first allotment has just been made.

The miners in this district are beginning to move for higher wages. The Darlaston men seem to be taking the initiative, and at a gathering a few days ago it was resolved to convene meetings of employers and operatives with a view to the price of coal being raised, and wages increased. It was stated that the present low wages are inadequate to maintain the miners and their families.

The finished iron trade of North Staffordshire is in a very unsatisfactory condition, and at most of the works there has been a less number of "turns" made this week than last. Prices are not so firm, and there is a perceptible inclination on the part of makers to accept good orders for immediate delivery at a slight reduction on recent quotations. The plate trade is not so brisk, but for hoops there is an improved demand. Pig-iron remains quiet, but the orders received are sufficiently numerous to prevent any of the present out-turn going into stock.

REPORT FROM DERBYSHIRE AND YORKSHIRE,

Sept. 23.—In the mining district there has been but little change of late, although in some few instances the rain has rather interfered with operations; efforts, however, are being made to open out some districts by means of railway communication, the want of which has long been severely felt. Indeed some of the oldest localities where lead has been raised for ages are in no way connected with any railway, and, to some slight extent at least, to this may be attributed the want of progress as regards the development of the minerals in several districts. There are comparatively few ironstone mines in Derbyshire, the greater part of the ore raised being in connection with the coal measures, But of late years not much attention has been paid to the local stone, our ironmasters being well satisfied with what they receive from Northamptonshire, so that not more than one-half of what was formerly raised is now brought to the surface. A steady business has been done in pig-iron, but prices are not quite so firm as they were a week or two since. At mills there has been a fair output of merchant iron, whilst the foundries as a rule are better off than they have been. The house coal trade is slightly better at some places, but short time still prevails, and is likely to continue. To London the Midland has taken a tolerably fair tonnage from Clay Cross, Grassmoor, Eckington, and several other places; but prices as yet have not improved, so that where profits are made they must be very small indeed. Steam coal, however, has gone off tolerably well, both for shipment and smelting purposes. The railway companies have also taken a good deal. Coke has sold somewhat freely, a good deal being for the works in Sheffield and the neighbourhood.

Some branches of trade in Sheffield have not been quite so busy as they were, but in nearly all of them there has lately been an improvement. With the United States a brisk business is being done in hardware and steel, and the orders in hand will last till the end of the year at least. Armour-plates, composed of iron and steel, are now being more extensively produced than hitherto, some good Government orders having been given out for them. Bessemer rails are in more active request, and makers have advanced prices, so that orders are not booked below 7*l.* 10s. per ton General railway material, ship and boiler plates, as well as sheets, are being largely produced. Government has just given out a heavy order for telegraphic wire for India, which has gone to the works at Tinsley. In best cutlery there has been a steady business done, principally on foreign account, for the home demand is still comparatively quiet, but file manufacturers are doing less than they did a few weeks since. An effort is being made by some persons to introduce machines for making files, but it is not likely to be successful, for hand-made files are considered by far the best. Pig-iron has sold rather freely of late, and even now that the market is less firm than it has been makers show no disposition to book forward orders. The Parkgate Iron

Company are pulling down the oldest of their six blast-furnaces, and the Rotherham Ironworks, which have been idle for some months past, it is said are about to be re-started.

In the South Yorkshire district the coal trade is still in a most unsatisfactory state, some pits being entirely idle, whilst at the others the men are on short time. The wages question has cropped up at several places, and unless there is a marked change wages must inevitably come down. House coal, however, has gone off rather better of late, more especially for the London market, but prices have not been affected. Shipments of steam coal have been rather heavy from the Humber to the North of Europe. A good business has been done in coke for iron smelting and other purposes.

The trade of Sheffield with the United States is again improving in a most gratifying manner. The official returns will not be published for some time; but we are in a position to state that the total exports of Sheffield steel, steel rails, cutlery, and general hardware to America for the quarter ending March amounted in value to 232,498*l.*, and for the quarter ending June to 291,559*l.* For the corresponding quarters of 1879 the totals were 105,313*l.* and 143,448*l.* There is thus a total of 524,047*l.* for the first half-year of 1880, as compared with 248,761*l.* for the first six months of 1879. It is believed that when the figures for the September quarter are known the increase will be more than maintained. For July the total value is 105,866*l.*, and for August 87,573*l.* The largest value of Sheffield goods ever sent to the States was in 1872, when the amount reached the total of 1,734,626*l.*; the lowest was in 1878, when the total was 429,016*l.* Last year the value had jumped up to 671,723*l.*; and this year promises to be considerably over 1,000,000*l.*

THE COAL TRADE.—The committee appointed by the Miners Conference held at Barnsley yesterday week, to take into consideration the best means of bettering the present condition of the miners of the district, met on Monday, and adopted the following resolutions: "That this committee is unanimous in its opinion that, in order to bring the district together, the three officials must be acknowledged; and the committee think that Mr. Frith should be financial and corresponding secretary; Mr. Chappell, agent; and Mr. P. Casey, organising and auditing agent; and the three should work together for the general good of the district. The committee recommend the district to adopt the same so as to have one grand association. That each lodge should deposit its surplus labour funds in a bank in the names of not less than three trustees appointed by each lodge; such fund to be invested in the name of the South Yorkshire and North Derbyshire Miners' Association. That each lodge having deposited in the banks its surplus labour funds that are not required for immediate use, such moneys shall not be withdrawn except by resolution of the executive, signed by the local trustees and the President, and countersigned by the district secretary, and that a copy of this rule be deposited in the bank where the money is invested. That the terms of entrance to this association shall be 2s. 6d. each, such amount to be paid in two fortnightly instalments. This suggestion or rule to remain in force one month from the date of the next conference. The committee further recommend that in future one of the district officials be President of the association, instead of one having to be appointed from the council from time to time."

REPORT FROM THE FOREST OF DEAN.

Sept. 23.—Since my last report there has been a decided improvement in the coal trade, which affords some satisfaction in writing upon the subject, for when trade continues dull so long, and report after report chronicles the dulness, the subject becomes wearisome to writer and reader alike, or very much so at all events. The export trade at Lydney and Bullo has experienced an impetus, nor must Sharpness be left out of the account. On Wednesday evening a very unusual thing occurred up the Bullo branch. A special truck train with coke was heard running up a few minutes before 7 o'clock, such trains having been very infrequent for a considerable time past. Having mentioned coke, I may add that the Messrs. Crawshay purchase most of their supply for furnace purposes in South Wales, finding it more economical to do so, being cheaper than the cost of home manufacture, besides finding that the Welsh coke ovens give them a better article. At one time the Messrs. Crawshay used to coke from 1200 to 1400 tons of coal weekly in their yards, whereas at present the coking done at Cinderford Ironworks is on an extremely limited scale, being only a small percentage of what was once done. Parties in the Forest are too much disposed to follow in the old ruts from generation to generation, instead of advancing with the times and the rapid strides of science, otherwise the local iron trade would have a more extensive development.

Only two furnaces out of the "teens" in the Forest are in blast, which is certainly not an encouraging circumstance—Parkend and Sewdley being all silent. I fear that getting up limited companies, and fixing the capital too high, is one feature of commerce in such matters that is against success. In such cases, the floaters who speculate aim to make a good thing by selling out, and the buyers paying more for plant, stock, and other property than they are worth, find, to their disappointment, that the returns from trade will not recoup them for their outlay and pay a dividend—and then things in such cases come to grief. But without applying such principles to any particular cases, I do think that if due business prescience and sound commercial maxims had had roper play in some cases in this district, stagnation in some local projects would not have occurred. However, it must still be admitted that the highest commercial wisdom and evident caution are, in some cases, especially at fault—but attempts at being too clever ought to fail.

At the recent Gale dinner, as well as on former occasions, reference was made to the Free Miners, as if they stood in the way of Forest prosperity. The inference, of course, is that if they could be set aside the Crown officials and proprietors would be brought face to face, and, therefore, more readily and effectually succeed in effecting the development of mineral property. I know the present *modus operandi*, but as the officials have not laid their plans of reform before the public I am unable to judge whether what they desire to introduce would be an improvement or not. I am satisfied, however, that improvements might be effected. It has been said that gales do not equal in number the Free Miners applying for them. Now if that be so, an improvement could be effected by grouping gales and then grouping the applicants—say half a dozen or more together. All the deep gales ought to be of large area or acreage, as small areas would not justify a sufficient outlay for development of the minerals, whether coal or iron; and if six or nine free miners were joined in one grant, it should be a rule that sales by them should be decided by a majority of their votes, and thus prevent any obstinate member from controlling his co-partners in doing business, by selling, leasing, or developing the property themselves. The votes of the majority should in all cases be binding, and end all disputes.

The hardware trades are much the same as at date of last report, so that special remarks are not called for. October being the month for advancing quotations in the coal trade some fear that the present improvement is only a spurt in view of that event, and that higher prices will give a check. We sincerely hope that the colliery proprietors will be wise and cautious in their deliberations and decisions for the coming autumn and winter's trade, so that no needless check to local trade may result.

IRON AND STEEL RAILS.—The total quantity of rails exported dnring August was 52,536 tons, against 40,881 tons in the corresponding period of 1879, and 29,427 tons in that of 1878. The former consisted of 8207 tons iron rails, and 44,329 tons of steel rails. The increased quantity has principally gone to the United States.

PATENT FUEL.—A return, based on the Custom House reports, has been issued of the amount of patent fuel—usually small coal compressed into briquettes—exported during the past month. It appears that the trade is chiefly centred in Wales, but that Sunderland is also numbered among the ports shipping patent fuel. From the three chief ports there were exported last month—Swansea, 17,032 tons (shipments from Neath, &c., being included); from Cardiff, including Penarth, 9672 tons; and from Sunderland, 1200 tons. Marseilles appears to be the largest consumer—the quantity sent last month being 2758 tons; Bordeaux taking about 2400 tons; Oran, 1804 tons; Ancona, 2506 tons; Bona, 1321 tons; and among the other ports to which smaller quantities are sent, being Dieppe, Havre, Sebastopol, St. Petersburg, Demerara, Jamaica, Venice, Bermuda, and Valencia, while the trade seems likely to grow in Northern Europe.

Meetings of Public Companies.

WHEAL PEEVOR MINING COMPANY.

A four-monthly meeting of adventurers was held at the mine on Tuesday,—Mr. THOMAS PRYOR, the purser, in the chair.

The statement of accounts showed that the labour cost was 3758*l.*; merchants' bills, 1712*l.*; lord's dues, 447*l.*; rates, taxes, &c., 106*l.* On the other hand there was black tin sold and delivered from June 21 to Sept. 20, 173 tons 12 cwts., at an average of 49*l.* per ton, realising 8522*l.*; extra carriage received, 16*l.*; arsenic sold, 19*l.*; tin leavings, 603*l.*; discount received, 6*l.*; showing a profit on the 16 weeks' working of 3141*l.* There was a balance brought forward of 895*l.*, which left a sum to be dealt with of 4037*l.*

The CHAIRMAN remarked that the adventurers would see that the tin credited had realised 49*l.* per ton, and the cost of production was the same as at the last meeting—28*l.* per ton. Their labour cost was about 330*l.* in excess of what it was at the last meeting. This was caused by the extension of their dressing-floors, the erection of a new calciner, and also a new patent pulveriser, all of which were charged in the present accounts. Their merchants' bills had also been increased, but these erections being paid for they would have no further extra cost at the next meeting. The increase in the labour cost and merchants' bills would represent at least 500*l.*, and they would have the benefit of that outlay in the future. They could easily have declared the same dividend that day as they did at the last meeting had it not been for this extra cost.——The agents reported:—

At the time of our last meeting we had only then completed the sinking of the engine-shaft to the 90. Since then we have driven the cross-cut at the 90 and cut the lode, also cut plat, divided and cased the shaft, and driven several fathoms west on the lode; since we cut it the lode has been very regular in size and productiveness. The lode now in the end is fully 5 ft. wide, and worth 20*l.* per fm. We might here state that the lode at the 90 is larger and more productive near the shaft than at any of the upper levels. We are also driving the 90 west on the new lode; as far as we have driven the lode is large, and is underlying more than we at first anticipated, which accounts for our not yet cutting it in the 60 cross-cut. The lode in the 90 end is worth 12*l.* per fm., and has a very kindly appearance. We expect to commence the sinking of our engine-shaft below the 90 in about a month hence. We are now driving the 80 end through the cross-course, and, like our upper levels, the lode held rich up to the same. At the 70 the lode improved in value west of the cross-course; this being directly over the 80 we feel quite certain of meeting with the same result here. The lode up to the cross-course was worth 30*l.* per fm. The lode in the rise in back of the 80 west is worth 15*l.* per fm.; this, when communicated to the 70, will open up a fine run of ground. The lode in the 70 west is worth 30*l.* per fm. The rise in the back of this level on the middle lode is worth 18*l.* per fm. The lode in the 60 west is worth 20*l.* per fm. The lode in the winze sinking in the bottom of this level (dbout 7 fms. beyond the 70 end) is worth 40*l.* per fm.; this is a fine feature for the 70 and 80 ends coming in under. We have a cross-cut driving north at this level to intersect the middle and old north lodes; we consider this a very good point, and expect soon to cut the lodes. We have another cross-cut driving south at this level to intersect the new lode, which we hope soon to reach. The lode in the 44 west is worth 12*l.* per fm. The lode in the 46, east of cross-cut, on middle lode, is worth 12*l.* per fm., with a kindly appearance. The lode in the rise in back of the 36 west is worth 25*l.* per fm. The lode in the winze sinking below the 26 is worth 20*l.* per fm. The lode in the 16 west is worth 15*l.* per fm. The main rise is now up fully 20 fms. above the deep adit level. We have five stopes working on tutwork, the lode being worth in each 13*l.* per fm. We have also 18 pitches working on tribute, employing 52 men and boys, at tributes varying from 5s. to 10s. 6d. in 1*l.* Our chief work at the old sump shaft during the past 16 weeks has been in clearing and securing the shaft and levels above the 40, and we expect soon to commence clearing the shaft to the bottom. We have a pare of men clearing the 60 east to get into the bottom of the above shaft, which is opening up a good piece of ground. Since our last meeting we have extendad our dressing-floors and put up new machinery, &c, to a large extent, and they are now working efficiently. We have also erected a new pulveriser, which we are pleased to say is doing its work exceedingly well. The chief portion of our extra cost this quarter is in our dressing department, which is now about complete. The mine, we are pleased to say, still looks well, especially in our bottom levels, and we hope the result of the coming 16 weeks' work will be equal to the last.

Capt. WHITE added that in his last report he anticipated one or two things which had not transpired, and he would make this clear as he went on. First, there was the cutting of the lode in the 60 cross-cut. It was stated in the last report that they expected to cut it every day, but the fact was they had no place wherefrom to see the underlie of this lode but in the shaft; and that being so close to their south lode the underlie of the lode was very irregular, and, consequently, they could not get any accurate observation about it whatever. They were now driving west on the 90, and they were getting away from the influence of the south lode, and they could ascertain better about its underlie. This was a great deal more than was at first anticipated, otherwise they should have reached the lode in the 60 cross-cut before now. Then, on the other hand, they were driving the 60 cross-cut on the elvan course, and this was going 30° east of south, and, consequently, they would have a further distance to drive than if they were going at right angles, but the difference in the price was somewhere about 6*l.* per fathom, and consequently they thought they could drive on this elvan course and reach the object they had in view better than by driving at an angle in such hard ground. Then the old sump shaft they thought they would be able to set soon to some tributers to work, but they had not had any tributers at work in the eastern part of the mine as yet. They commenced at once to clear the levels above the 110 and above the old sump shaft. In clearing these levels they found a great deal more difficulty than they anticipated, and it took them a great deal more time in timbering than they expected. They had now commenced clearing the level at the 60 in the cross-cut east of the present engine-shaft, and they calculated being able to get this right and get under the old sump shaft in six or seven weeks from this time, when they would be able to set a great number of tributers to work. In the 90 the lode was better than in any level they ever had above it. At the shaft it was better than they had ever seen it, and this he considered a very great feature. He calculated that when they commenced to sink their shaft that in a few fathoms sinking they would meet with the intersection of the two lodes, and he hoped with a bunch of tin. He saw no reason why they should not. As regarded the general prospects of the mine underground, he did not know that they were ever very much better; their ends and the valuation of the different points were exceedingly good, and he hoped their returns next time would be equally as good as they were now. (Applause.)

Capt. White, in reply to Mr. BABBAGE, said the 90 was 150 fms. from the boundary, or just in the centre of the sett. The 26 was up to the boundary at West Peevor, and worth 20*l.* per fathom. The deeper levels were a gradual distance away from the boundary.

On the motion of Mr. F. W. MICHELL, seconded by Mr. THOMPSON, of Rotherham, the accounts were passed.

The CHAIRMAN said they must now consider what they would do with the balance. As Mr. Thompson was the largest shareholder, they would be glad to hear what he had to say on the matter.

Mr. THOMPSON thought their dividend on that occasion should be 1*l.* 2s. 6d. (Hear, hear.) It was a little more than the profit, but it had been fairly earned by charging everything up. He did not think such things as calciners and pulverisers should always be charged entirely against the current account, especially during the time of a falling market, as it had been for tin during the last three or four months. He thought they should also look to the fact that there were shareholders with them who had purchased their shares at a high price, and they should try to give them a fair dividend. He had no doubt they would be able to make as good a dividend, if not a larger, on the next occasion, as they would not have such an outlay during the next four months. He, therefore, had pleasure in moving that a dividend of 1*l.* 2s. 6d. be declared.

The CHAIRMAN said that would leave a balance to be carried over of 662*l.*——Mr. EARNSHAW, of Monmouth, seconded the motion, and it was carried unanimously.

Mr. THOMPSON said as the day for holding the next meeting would be very inconvenient for him, as he had an engagement elsewhere, he would be glad if their meeting could be held a week later.——The CHAIRMAN pointed out that this would necessitate another month's labour cost being charged in the account, and after some discussion it was resolved to hold the meetings quarterly in future.

Capt WHITE warned the adventurers that they were not likely to get so large a dividend in three months' time as they had been getting in four months, although he would do his best.

On the motion of Mr. CHELLEW and Mr. COCK, a vote of thanks was passed to the Chairman and the agents for their able management of the mine.——The CHAIRMAN, Capt. WHITE, and Capt. KING briefly acknowledged the compliment.

Mr. THOMPSON, in proposing "Success to the mine," said they had now received 6*l.* 8s. 6d. per share on a capital of 7*l.* 11s. per share, so that another dividend would pay them back the whole of their capital. That, he believed, was carrying on mining in something like the olden times, when as he understood, it was the practice to pay back the capital before they paid dividends, but it amounted to the same thing as paying dividends. From what he could see, they had a prospect of continuing dividends as good as that they had declared that day, and he trusted they would have better. They had heard a great deal about tin, and the grand prospects there were before them, and the big dividends they were likely to get; but their hopes had been blighted, and they had to be content with smaller things. He thought the less he said about the future of tin the better, and leave the big people to talk about it. The best thing they could do was to set to work, and try and return their tin at the smallest cost they could. He believed every effort was being made by their captain and the agents in this direction. The fact of their having a pulveriser was an evidence that if anyone could propose anything to reduce the cost they were willing to adopt it. He trusted that would always be the character of the agents of that mine. He was rather surprised on reading that at Wheal Eliza they could prepare their tin ore for market at 19s. per ton, and he would like to know what Wheal Peevor tin cost. He had been at Wheal Eliza Mine, and he believed Wheal Peevor floors were just as well laid out as those at Wheal Eliza. The only difference he saw was that they were very careful in wrapping up their pipes, and they had got a stone-breaker, but they had to take their stuff to a calciner, which was some distance away. He believed Capt. White would take hold of anything that would reduce the cost, and that Mr. Michell would do his best; and as regarded their purser, all knew how anxious he was for the well-being of the mine, and they were altogether as well served by an executive as any mine in the county.

Capt. WHITE, in responding, said that was his fifth birthday. (Loud laughter.) It was five years exactly to the day of the very month since he was appointed at Wheal Peevor—Sept. 21, 1875. He had seen many ups and downs since then. He found that their first dividend was declared in 1878. Since that time he found that they had divided amongst the shareholders 19,275*l.* In that time they had returned in black tin, independent of their tin leavings, 1488 tons, and when he told them that the chief portion of this tin had been returned with 32 stamp-heads only, he thought they would say it was a very clever trick. Of course they knew that they had now got 16 extra heads added, but that was only since last quarter. He was pleased to say that Wheal Peevor was still holding her own, and he believed she could still do so. He hoped, however, that now they were to have their meeting every 13 weeks they would not expect 170 tons of tin to be returned in that time. If so, they must try to get it. As far as he could see they could get as much as they had a mind to. As to the cost of returning the tin, the average of their tinstuff was 5 per cent.—1 cwt. of black tin to the ton, and it cost them 28*l.* per ton; but if they got stuff with 2 cwts. to the ton that could be returned much cheaper. Poor stuff required to be treated over and over again, and required a great many more hands. The results in returning the stuff at Wheal Peevor would bear comparison with any other mine, and he hoped they would continue to bear that favourable comparison. There had always been reports in circulation about that mine, and very little things affected the price of shares, but the mine would still go on and pay dividends. They had got a good property in Wheal Peevor. He never saw a better lode in his life than the south lode. A lode that would return tin at the rate that they had been returning there was, he thought unparalleled in the county, not even excepting Dolcoath. (Applause.)

Mr. EARNSHAW, in proposing "The health of Mr. Michell," stated that he had commenced his interest in Wheal Peevor in 1872, by purchasing 50 shares for 22s. 6d. per share. In less than three weeks he sold them again for double that price. He subsequently bought some shares at 5*l.* 2s. 6d. per share, and had paid calls and had ever since retained his interest, because of the confidence he had in the management. (Applause.)

Mr. MICHELL, in responding, said Wheal Peevor was now established as a permanent dividend-paying mine, and they could still continue to open in the mine much more tin than they were taking away every month. The bottom part of the mine especially was looking exceedingly promising at the present time. Few people could speak with any degree of certainty as to the price of tin, but he did not see haw the price could remain so low as it was for any lengthened period, for although some mines were able to return tin at the present price with a very good profit indeed, there were many large producing mines in the county that could not make a profit with the present price, or at all events very little indeed, and as they had established the fact that they could produce tin as cheap as they could in the alluvial diggings, they had starved them out. ("Serve them right.") They could show the foreigner that they could live where he could not. However, he liked the principle of "Live and let live," and if they could only have 50*l.* or 60*l.* for black tin, Cornish mining on the whole would do very fairly. They might still see a few ups and downs, but although they might be under a cloud for the moment, he believed the time would come when they would see tin at a living price all round. (Applause.)

The CHAIRMAN proposed "The health of Mr. Thompson, Mr. Earnshaw, and Mr. 'Banker' Boyns." The first-named gentleman responded briefly, and Mr. R. BOYNS said he was proud of Capt. White as a St. Just man, and another St. Just man had just been appointed manager of a Redruth mine. With regard to the price of tin he said he had constant information from Australia, and he was satisfied that that they had only alluvial deposits, and had no lode. But supposing they had, Capt. White could match them in working lodes, and the foreigners must have St. Just and Redruth men to work them, and they would have to pay them twice as much wages and pay much more for machinery than what they did in England. Where they could shovel it up they could do that in a short time. Unless there were some fresh discoveries he was satisfied that Australia would be comparatively worked out in a short time. That the consumption was going on increasing, and the production of tin was not increasing, and the supply and demand must right itself. Those market operations beat everybody, and anybody who said what tin would be in three months must be a fool. The reporters had made him say that tin would be 70*l.* before next Christmas, but he meant Christmas twelvemonths. (Laughter.) Numerous as the new bals might be there would be less tin produced in Cornwall during the next year or two, because of course men would be taken from paying ground to work in unwrought ground. He would not sell the 400 tons of tin that he had in stock if they offered him 70*l.* a ton for it. They had stocked it so long that they were going to keep it till they got a good price for it.

The PURSER, in responding to the toast of his health, said with reference to the profits they had made in Wheal Peevor during the last 2½ years and the ruling price of tin, he would say that the first dividend was declared when tin was at a low price. It had been stated that very few mines could pay profits with tin under 50*l.* per ton, but they had declared dividends there, and the average price of tin was 40*l.* 8s. 9d. per ton. The first dividend of 5s. was declared on April 11, 1873, when tin was sold at 35*l.* 12s. 6d. per ton; Aug. 1, 5s., tin 34*l.* 5s.; Nov. 9, 5s., tin 32*l.* 15s.; March 11, 1879, 7s. 6d., tin 33*l.* 12s. 6d.; July 1, 10s., tin 36*l.*; Oct. 21, 16s., tin 40*l.* 10s.; Feb. 10, 1880, 32s. 6d., tin 54*l.* 10s.; June —, 25s., tin 47*l.* 14s.; Sept. 21, 22s. 6d., tin 49*l.* This was the bright side of the picture, but on the other side he would remind them that they had gone on making calls in that mine for five years. He was in the chair at every meeting, and they made 18 calls, varying from 2s. 6d. to 17s. 6d, making a total of 7*l.* 11s., or a total of 22,650*l.* They were now reaping their reward, and, as Mr. Thompson had said, the present dividend was equal to 50 per cent. of the capital of the company. He hoped to have the pleasure of giving another dividend, which should entirely repay the outlay on this mine. He was pleased to be able to say that they had gentlemen with them who had been with them from the very commencement, and he hoped they would remain with them for a long time to come.

"The press" and other toasts followed.

MID-DEVON COPPER MINING COMPANY.

The adjourned ordinary general meeting of shareholders was held at the offices, Royal Exchange Buildings, on Wednesday,

Mr. JAMES WILSON in the chair.

Mr. FRANCIS R. REEVES (the secretary) read the notice calling the meeting.

The CHAIRMAN said—Gentlemen, in the report we have given you in a very condensed form, an account of all that has been done since our last meeting. You know the hopes we had then, and the hope we have for the future is told here. You will recollect that the last time we met we had come upon good ore ground at the 80, and we turned our attention to that at all points with the utmost promptitude. We engaged all the miners that it was possible to put upon the different points, and we were led to hope there would be the greatest success, especially at the 80 fm. level; but we were disappointed. We passed through promising ore ground, but it disappeared. All the upper levels have been searched in the same way, and although all mining men acquainted with these matters say we are in the vicinity of rich ore ground, still up to the present time we have been unsuccessful in finding ore in paying quantities. Gossan has been found in the upper levels in beautiful specimens—an indication that a great bulk of ore must be in the immediate neighbourhood. Therefore, we cannot be far from the ore; but, as our small capital was melting away, we had to look the thing boldly in the face, and see what was best to be done in the future, and, having been advised our great hope is in increased depth, we have made up our minds to use the remainder of our capital in sinking to the 100 fathoms. In order to do this, we have had to find people who would take up 4000 of the shares still in our hands, and I am glad to tell you that one of our directors, who has already a large interest in the undertaking, having been down to the mine last week, immediately on his return offered to take up 3000 of those shares himself, provided we did that which has been always recommended—that is, that we should go on sinking. (Hear, hear.) The directors were quite agreed with the proposition made by their fellow director, and they have agreed to place the other 1000 shares. With this money we shall go down to 100 fms. depth, and I hope we shall meet with the success which I think you will all agree we deserve. All our pumping machinery is in perfect order. The only thing against us in former times was not having efficient pumping machinery, but now we have machinery second to none in England, and we can go on sinking. Not a farthing is to be spent needlessly. The directors, as you know, work for nothing. We are all large holders, and I think there can be no greater guarantee given to any industrial undertaking than that some of the members of the board having special knowledge are large holders, also that other members who may not, perhaps, have special knowledge, yet are also very large holders; and are willing to show their confidence by taking a still larger interest. I do not suppose that in the coming six months we shall have any very great change to report; indeed, we do not expect any great change until we reach the 100. In conclusion, the Chairman moved the adoption of the report.

Mr. T. N. ROBERTS seconded the resolution, which was put and carried.

Mr. T. N. ROBERTS said that all the best mining experts had expressed an opinion that in the Mid-Devon they had as good a mine as any in Great Britain; but, perhaps, the greatest reliance was to be placed upon the report of Captain James Richards—made some years ago—who was agent for the Devon Great Consols during its period of great prosperity. Capt. Richards examined the Belstone Mine several times, and his good opinion of it was confirmed every time he went down that it was one of the best mines which could be. It must be borne in mind that in the 80 this was a shallow mine. The mine was situated at the highest part of Dartmoor, and at present the lowest workings were only just on a level with the valley; and, therefore, although ore had certainly been found in the upper workings, still it was not surprising that it had not continued, or that great success had not been met with in getting more ore in the lower levels. There were indications in the levels of ore being in the vicinity, but now that they were going to sink below the level of the valley there were better prospects of success than when they were only on a level with it, or above it. (Hear, hear.)

Mr. WYLDE asked how long the present money would allow of explorations after the greatest depth was attained?——Mr. ROBERTS said it would enable them to go through the cross-course 10 fathoms to the lode. He went minutely into the question of expense with the captain when he was at the mine.

Mr. JOHN GOULD said he hoped the shareholders would distinctly bear in mind that the money was to be exclusively expended in sinking to a greater depth.

Mr. WYLDE expressed his sympathy with the directors in their endeavours to make the mine a success, and said he should like to hear some expression of opinion as to how fresh capital was to be provided in the event of the present capital being spent without any returns being obtained.

The CHAIRMAN said that if the indications at the end of that time were at all favourable he believed there would be no difficulty whatever in raising fresh capital if wanted. (Hear, hear.)

Mr. ROBERTS said he could corroborate what the Chairman had said about the machinery being in splendid order. There was ample water-power; they had the whole run of Dartmoor; the water was brought by a leat 1¼ mile in length, so that the expense of running the machinery were very small.

The SECRETARY said the pumping engines were capable of raising 400,000 gallons of water every 24 hours.

The CHAIRMAN, in reply to further observations by Mr. WYLDE, said the water in the mine was highly impregnated with copper. He believed they were never in a better position than at present for securing the success of the mine.

Mr. PEEVOR: I think we should express our confidence in the directors by according them a cordial vote of thanks. The fact that they are ready to come forward and help us when we are in difficulties is a proof of the honest way in which the affair is conducted. (Hear, hear.)

Mr. LANE seconded the resolution, which was put and carried; and the CHAIRMAN having acknowledged the compliment, the meeting broke up.

MOSTYN CONSOLS SILVER-LEAD MINING COMPANY.

The first ordinary general meeting of shareholders was held at the Bloomsbury Hotel, Manchester, on Monday, Sept. 13,

Mr. WM. FURNESS (of Westmoreland) in the chair.

Mr. WM. GILBODY (the secretary) having read the notice convening the meeting,

The CHAIRMAN said—The present meeting is, as you are probably aware, convened in compliance with an Act of Parliament, which renders it compulsory on every company to hold a meeting of its members within four months after its registration or incorporation, not necessarily for the transaction of business, because the period in many instances between the date of registration and meeting is but sufficient to enable the company to pass through its preliminary stages, and to settle down into a permanent and workable existence. Although this is so the Legislature in my opinion acted with wisdom in thus making provision so as to enable the directors to meet their co-partners the shareholders at as early a date after the formation of the company as would admit of a statement being made that the undertaking had been satisfactorily established and the objects for which it had been formed were being carried out. But in this case it is more especially important, from the fact of the extraordinary discoveries that have taken place since the company commenced operations—discoveries, I am told, of an unprecedented nature, which prove most satisfactorily indeed all that has been said about this most valuable property. In my opinion, and indeed in that of all who have seen the mines latterly, it has been proved beyond all doubt that large stores of silver-lead ore lie embedded in the extensive sett now being worked by our company, but the works hitherto carried on have been on a too diminutive scale, and are quite inadequate for its full development, as it is certainly in my mind worthy of the most vigorous working—in fact, it has already been decided by your management that proper and scientific operations on a suitable basis shall take the place of the former defective workings, and for that purpose a new engine-shaft of suitable dimensions has been contracted for to be sunk to a depth of 40 yards (at a spot some few yards from the shaft known as the timber shaft) directly on the course of the lode, and there can scarcely be a doubt that before the full depth of 40 yards is reached ore will be met with in large quantities. The present timber shaft will be simply used as a ladder-way, also being utilised for the purposes of ventilation. The directors have decided that they will not yet proceed with explorations in other parts of the sett, although they are firmly convinced that further outlay will be amply repaid, more particularly with respect to the Furness shaft on the Holway lode, which in the opinion of competent mining engineers only requires to be sunk to a greater depth to bring about profitable results. The new engine supplied to the company by Messrs. Marshall, Sons, and Co., Gainsborough, is erected on the ground, and the pit and winding gear are all attached and in complete working order. As to the working details, I have no intention to enter into them, as the manager at the mines (Capt. Woolcock) is present, and he will no doubt give you precise and concise particulars in relation thereto in his report, which I perceive he is very anxious to give us. The directors have, therefore, much pleasure in meeting you here to-day, and in being able to tell you that the progress made up to the present time in carrying out the objects for which the company was established has been most satisfactory. Before resuming my seat permit me to express my entire confidence in the future success of the workings, and to congratulate you jointly and severally on having acquired a truly valuable property on such easy terms, and which will, I doubt not, ultimately redound to the credit of all concerned. Capt. Woolcock will, no doubt, now favour us with his report.

Capt. WOOLCOCK then read his report as follows:—

Sept. 11.—In presenting my report of the progress of the works on the above mines since February last it is my pleasing duty to say that we have succeeded beyond all expectations, considering the short time that has elapsed since the formation of the company. Knowing, however, that the Act of Parliament compels you to meet the shareholders within four months from the date of the registration of the company for the purpose of rendering information of the company's doings I will enter into some details of the work done under my supervision. I will commence with the timber shaft. After spending some weeks in clearing out this shaft and securing the same with new timber it was found that the shaft had been sunk to a depth of about 20 yards, but not having been worked for the last 30 yards fully one-half of the above depth was filled with debris, all of which had to be drawn to the surface. When the bottom was reached I observed that a short level had been driven on the south side of the shaft some 13 or 14 yards, taking a circuitous route to the east, evidently for the purpose of intersecting the lode which was believed to exist there or thereabouts, but apparently the old miners had abandoned the idea, and had commenced another level leading out of this, and bearing to the east some 4 or 5 yards, when it had evidently been given up in despair, as there were no signs of the lode in either level. On examining the ground minutely in company with Mr. Entwistle, and taking particular notice of the strata, we were led to believe that the lode lay to the north of the shaft, and my belief was substantiated by the old miners in the neighbourhood. Acting on this belief I put on men to commence a level to run due north. After two or three days' excavations a kind of black shale was met with, dipping to the north considerably, and I at once instructed the men to follow the course of this dip, when presently indications of felspar made their appearance, thus proving unmistakeably that we were on the right track, and after driving some 20 yards our efforts were crowned with success by the discovery of the back, or the top, of the Gorsedd east and west lode. This driving, and following the dip of the shale, had taken us down a further depth of 10 yards, thus proving the lode to be about 30 yards from the surface.

After proving the lode from the hanging wall, which dips almost perpendicularly, producing a beautiful white spar, intermixed with lead ore, yellow clay, and chert stone, the work became somewhat difficult and laborious; in the first place from want of air; and, secondly, from being compelled to drag the debris up the great incline to the bottom of the shaft, and thence to the surface, besides being troubled with water—always a certain indication of a lode. The men were often an hour at a time waiting for the purification of the air after each blast. You are, no doubt, aware that the ground had to be blasted all the way, as it is entirely on the limestone formation, and abutting on the great coal measures. Under these circumstances, and after consulting with the managing director, it was decided to stop the men from further operations, as on calculation it was proved that it would be far cheaper and easier to sink a new shaft right on the lode to act as a ventilator. In closing my remarks respecting the above I have to say that a contract was entered into on Aug. 16 last with Mr. Benjamin Owen for the sinking of a new shaft 40 yards deep, which contract has to be completed in about three months from the date under a penalty. I have to report considerable progress therein, and, in fact, I may say lead ore has been already discovered.

Furness Shaft: At the bottom of this shaft, fully described by Capt. Goodman Ellis in his report, we have driven a level for some few yards, and have, I am happy to say, discovered the lodes already named by Capt. Ellis, but no work has been done here for some months, as all our force has been required in other workings. This shaft ought to be sunk 20 yards deeper, then drive out on the course of the lodes referred to, then I have no doubt but what we shall have good and lasting returns from this part of the mine.

Corner, or Mostyn Shaft: This shaft is only of small dimensions—about 2 ft. 6 in.—and had evidently been sunk by former workers merely as a trial shaft; it is within some few feet of the high road, and was filled with debris to the surface. On examining the debris surrounding the mouth of the shaft my geological knowledge informed me that the explorers had been more successful here than in the timber-shaft, as I observed that the debris was highly mineralised, but not noticeable to the non-professional eye. I, therefore, decided at once to clear out the shaft, and set men on accordingly. After some weeks of labour the bottom was reached at a depth of 20 yards, and the shaft found to be in perfect repair. At the bottom of the shaft a level had been driven running in a direction east by north, and 25 ft. from the bottom, a cross-cut had been driven north 6 ft. south 18 ft., evidently for the purpose of intersecting the lodes; this level then was continued 19 ft. further, and then went north-north-east for 16 ft. more, after which it went due east and west for 23 ft. further, then turned north-east again for 18 ft. 6 in. When the shaft now known as the engine-shaft was reached, in the roof and in the sole of this level strings of lead ore are to be seen varying from 1 to 2 in. in thickness, thus proving that the main lode is in the immediate vicinity, but had never been properly discovered by the old workers. After several weeks expended in clearing out this shaft and levels I found that the water of the last 25 or 30 years had exposed the lode, the same having dipped from the hanging side thereof; it, however, became absolutely necessary that the mine should be entirely free from water. After vainly endeavouring to make it so we failed to keep it down by horse power, consequently I at once consulted with the managing director, who said that an engine of sufficient power should be at once obtained, and about the middle of May a splendid new engine, made by Messrs. Marshall, Sons, and Co., of Gainsborough, was placed in position, and after a few days' labour we were enabled to wind up the water at an extraordinary rate. Having at last freed the mine from water operations were begun in real earnest, which in the course of two months' labour enabled us to open out one of the most splendid lodes of its depth in Flintshire. This lode, I have no hesitation in saying, will produce, from present appearances, from 2 to 3 tons of ore per fathom of ground, and I firmly believe that as depth is obtained there are evidences that this lode will produce ore equal to what they had in the celebrated Gorsedd Mine adjoining—viz., from 24 to 30 in. in width of solid ore. This was being quickly proved when the heavy rains in the beginning of August came on; the engine was worked night and day to keep the mine free from water, until the last heavy downfall of rain on Friday and Saturday, Aug. 6 and 7, completely drowned us out, causing the water to rise 47 ft. in the shaft, thus proving beyond doubt that pumps would be required, and I am now informed that a set of sufficient power have been ordered for the purpose.

Garden Shaft: This shaft is 27 yards deep from surface, and was much too small for proper working. It has now been made 6 ft. long by 4 ft. wide, sufficiently large for winding the ore and for pumping the water. It has been a tedious job, being a labour of several weeks, and I am satisfied that there is not a better shaft of its size in the neighbourhood. In conclusion, I am highly pleased to think that we have so far exceeded all expectations—and, in fact, more than proved all that has been stated in the reports in your prospectus, considering the time most other companies have to expend in searching for the lodes and proving the ground, which is generally two or three years and more, with a cost of some 4000*l.* or 5000*l.* I now make this assertion, that we have proved beyond question that we have one of the richest mines in the country, at almost a nominal cost and a few months' labour—an absolute fact almost unprecedented.—JOHN WOOLCOCK,

The provisional directors then resigned, and the meeting proceeded with the business of electing new directors.

Mr. WM. POOLE, the well-known public accountant, of Manchester, in proposing a vote of thanks to the retiring directors, stated that he had gone minutely into the accounts presented by the brokers of the company, and had carefully checked all the vouchers therein, and he certainly must say he was much surprised to find that not one farthing had been spent in advertising, a fact almost hitherto unknown to him in all his great experience, as he had found that it was rather the rule than the exception that in many companies, with a nominal capital of 15,000*l.* to 20,000*l.*, a sum of from 1500*l.* to 2000*l.* had been spent in advertisements, and he must say that he thought that a company which had arrived at the stage this company had without advertising, and at so small a cost, was very likely to thrive; and if required he was prepared, for one, to double his interest in the company. He had, therefore, much pleasure in proposing a vote of thanks to the retiring directors, by whom so much had been accomplished in so short a time.—The motion having been briefly seconded by Mr. HOLGATE, was carried unanimously.

It was also proposed by the CHAIRMAN, and seconded by Mr. JOHN FURNESS, that the best thanks of this company be given to Capt. Woolcock for his able services in the management of the mines.—Carried unanimously.

Capt. WOOLCOCK, in thanking the company, said he was proud to think that his services had been so well appreciated, but he thought deeds were better than words, and he hoped before he met the shareholders again that there would be a great many tons of ore raised, and placed to the credit of the company.

It was then proposed by Mr. ENTWISTLE, and seconded by Mr. MILLWARD, that the best thanks of this meeting be given to Mr. William Furness for the able and courteous manner in which he had fulfilled his duties as Chairman.—Carried by acclamation.

The CHAIRMAN on rising was loudly applauded. He said that he was much pleased in the way the little services he had rendered were approved of, and also begged to thank them for the honour they had done him in re-electing him to the important office of Chairman of this company—for important he felt it to be—as he had every faith in the future of the company, and firmly believed that the mines would eventually take one of the foremost positions in North Wales. He could assure the shareholders that nothing as far as his small abilities were concerned would be wanted on his part to render the concern the great success it deserved to be, and was only sorry that his age and the distance he lived away prevented the constant attention he would like to give to it. He, therefore, again begged to thank them for the kindness with which he had been received. (Applause.)

NEW WEST CARADON MINING COMPANY.

A general meeting of adventurers was held at the offices of the company, Gracechurch Buildings, Gracechurch-street, on Wednesday, "for the transaction of such business as may then be considered necessary."

On the proposition of Mr. ORLANDO WEBB, seconded by Mr. A. GUTIERREZ, the chair was occupied by Mr. H. L. PHILLIPS.

Mr. JOHN WATSON (secretary *pro tem.*) read the notice calling the meeting; he also stated that the whole of the 6000 shares had been accepted and paid for. He then read the following short report from Capt. Richards, dated Sept. 21:—

Sept. 21.—As stated in last week's report, the ground in Hallet's cross-cut is easier for driving, and was re-set last Saturday at 5*l.* per fathom, the month. The stratum is of the true mineral-bearing character, and I have every reason to believe that when the different lodes are reached (and every effort will be made to accomplish this as soon as possible) the shareholders will be amply rewarded for their outlay and perseverance.—N. RICHARDS.

A plan was exhibited showing the general position of the mine with regard to West Caradon, and it was pointed out that owing to the run of the lodes any discovery in New West Caradon must of a surety be of advahtage to West Caradon.

The CHAIRMAN said the first business was to elect the committee.

Mr. RISLEY proposed that Mr. James Macfarlane, Mr. H. L. Phillips, and Mr. A. Gutierrez be elected the members of the committee.—Mr. ORLANDO WEBB seconded the resolution, which was put and carried.

A resolution was also passed fixing the remuneration of the committee at three guineas each meeting.

On the motion of Mr. ORLANDO WEBB, seconded by Mr. GUTIERREZ, Mr. John Watson was then appointed secretary, with a remuneration of six guiucas per month of four weeks.

The next business was the election of an agent at the mine. The name of Capt. Richards was received almost as a matter of course, it being felt that his great experience of the district and well known ability as a miner pointed him out at once as the most eligible person to fill that responsible post. The only point which raised a question was that of the amount of remuneration. Mr. C. B. PARRY and one or two other gentlemen thonght that something over six guineas per month should be given, but the general feeling seemed to be that six guineas per month for the present would be a fair remuneration, subject to increase when tangible results are obtained from the mine. In the end the following resolution was carried, on the proposition of Mr. C. B. PARRY, seconded by Mr. ORLANDO WEBB:—"That Captain N. Richards be appointed agent of the mine, with a salary for the present of six guineas per month of four weeks."

On the motion of Mr. ORLANDO WEBB, seconded by Mr. A. GUTIERREZ, Mr. W. H. Watson was appointed local purser to the mine, with a remuneration of four guineas per month of four weeks.

Some discussion then ensured on matters of detail, and on the motion of the CHAIRMAN, seconded by Mr. ORLANDO WEBB, the following resolution was passed:—"That a banking account be opened at such bank or banks as the committee may select, and that all cheques be signed by two members of the committee, and countersigned by the secretary."

A vote of thanks to the Chairman closed the proceedings.

DOLCOATH MINING COMPANY.

A three-monthly meeting of shareholders was held at the mine on Monday.

The statement of accounts for the twelve weeks was as follows:—Labour costs, 9180*l.* 19s. 4d.; merchants' bills, 4234*l.* 4s. 10d.—total, 13,415*l.* 4s. 2d. On the credit side there was for 347 tons 15 cwts. tin ore sold (less dues), 17,076*l.* 8s. 10d.; extra carriage of tin, 14*l.* 4s. 8d., making a total of 17,090*l.* 13s. 6d., and leaving a profit on the working of 3675*l.* 9s. 4d. The balance now in favour of the mine is 2810*l.* 11s. 8d.

The agents (Capts. Josiah Thomas, manager; James Johns, and Joseph Chynoweth) reported as follows:—The engine-shaft is sunk nearly 11½ fms. under the 352. The lode is worth for the length of the shaft (12 ft.) 140*l.* per fathom. The winze under the 352, east of engine-shaft, is worth for 9 ft. long 70*l.* per fathom. The winze under the 352, west of engine-shaft, is worth for 9 ft. long 85*l.* per fathom. The 352, east of new east shaft, is worth 20*l.* per fathom. The 352, west of old sump, is worth 12*l.* per fathom. The 338, east of new east shaft, has much improved in appearance, and is worth 25*l.* per fathom. The rise over the 338, east of new east shaft, which is being put up on the soft part of the lode, is producing a little tin. A better part of the lode is standing by the side of the rise. The 314 west of Harriett's shaft is worth 25*l.* per fathom. The 295, west of man-engine shaft, is worth 30*l.* per fathom. We have commenced to drive the 295, east of man-engine shaft, where there is a large piece of unexplored ground. The lode in this end is worth 20*l.* per fathom. The 275, west of man-engine shaft, is holed to the winze under the 264, and the ground between those levels laid open for working. The end is now worth 15*l.* per fathom. The 290, west of Stray Park shaft, is worth 8*l.* per fathom. We intend shortly to commence to sink this shaft deeper.—South Lode: The 290, west of cross-cut, is worth 18*l.* per fathom. The 266, west of cross-cut, is worth 10*l.* per fathom. The lode in the 266, east of cross-cut, is very much improved, being now worth fully 40*l.* per fathom. We consider this an important feature, as this is the furthest level east on this lode, and is thus going forward in unexplored ground. The 242 cross-cut is still being driven towards this lode.—New Lode: The 295, west of Harriett's shaft, is worth 12*l.* per fathom. This lode is not yet intersected in the cross-cuts at the 275 and 248, but cannot now be far distant. About a fortnight after our last meeting an accident occurred in old sump shaft, between the 40 and 60—the timber in the old workings (which was probably put in more than 50 years ago, and which could not be got at to be examined) having given way, and filled the shaft at that point. We have been engaged from that time to the present in clearing and securing the shaft, and have consequently not been able to draw any tinstuff through it for the past 10 weeks, which has interfered considerably with our returns for this account. The shaft is now approaching completion, and we hope to be in full course of working in three or four weeks time.

The CHAIRMAN stated that at a meeting of the committee, held on July 19, a letter was read from Mr. Bolden (Mr. Basset's agent), intimating that as tin had advanced in price since his previous letter was written Mr. Basset would expect a higher rate of dues. On the same day the committee waited on Mr. Bolden, at Tehidy office, to enquire what Mr. Basset's intentions were, when he intimated that Mr. Basset's opinion was that the rate of dues should bear a certain proportion to the amount of profits, and promised that a full statement of Mr. Basset's intentions should be sent to the committee before the meeting of the adventurers. At a subsequent meeting of the committee (Sept. 14) a letter was read from Mr. Bolden in reference to the dues, in which he stated that although Mr. Basset considered he was fully justified in demanding the full dues reserved by the sett he did not propose to take higher dues than 1-20th except when the adventurers received four times as much as himself.—On the motion of the CHAIRMAN, seconded by Capt. W. THOMAS, the accounts were passed.

Capt. JOSIAH THOMAS said that in another month they would begin to drive a level at the 164. The shaft was now down 11½ fms., and after sinking 6 ft. deeper they would be in a good position for driving. When the winzes—the one to the east and the other to the west of the engine-shaft—were holed to the bottom level a very large piece of tin ground would be laid open. (Hear, hear.) The most important thing in the report he thought was the lode in the 266 east of new east shaft, on the south lode, which was worth fully 40*l.* a fathom. (Applause.) At the present moment it was worth about 5*l.* a fathom, but they did not like to report it too high. That end was about 200 fms. from the eastern boundary of the sett and the furthest level in that part of the lode. In fact, the lode had only been cut at the 170 towards the eastern boundary, and from this 266 east there was at least 80 fms. standing whole above it, and they thought that very probably the south lode had fallen into the main lode before coming to the 338 east of new engine-shaft. It was only 5 fms. short of the 266, so that in all probability they were entering upon a run of tin ground in that direction—the eastern part of the mine. It promised to be a very valuable thing. From the 266 to the 338 was about 80 fms. in height, and they should drive the 290 this week, and also probably one other level eastward, and they thought there was every probability of their opening a very large quantity of productive ground in a short time. (Applause.) The new lode had not been intersected in the cross-cut in the western part of the mine, although they said at the last meeting that they hoped to open it in about three months; but the fact was they were obliged to take the men from there to repair the old sump shaft. In less than a month, however, they should probably intersect it at the 275 and 248, and after that they should drive cross-cuts at shallower levels to intersect the same lode. The accident to the old sump shaft had thrown them back considerably, but he thought they had done wonderfully well, considering that one shaft out of four had been idle for ten weeks. The other shafts, fortunately, went on very well, and they had no water at the bottom of the mine, and they had been able to raise nearly 350 tons of tin. (Applause.) The stock of tin that they had in hand had all been sold off. (Applause.) At the beginning of the year they had 210 tons in stock, valued at 12,390*l.* They sold 80 tons in January, at 55*l.* per ton, the highest point reached then. The next quarter they sold two parcels—56 tons 12 cwt. 3 qrs. at 60*l.* and 61*l.* 17s. 6d.; and afterwards 72 tons, making together 209 tons 15 cwts. sold from stock, realising 11,817*l.* 17s. There having been 12,390*l.* charged on account of the tin, there was shewn a deficiency at present of 572*l.*, but they should raise 10 or 12 tons of tin extra, and square that account next time, all being well, and provided they had no accidents. They had sold the tin at the highest prices each quarter. Their average price this quarter was 51*l.* 10s. In the beginning of the year they owed 6000*l.* to the bank, and now they had 4500*l.* in the bankers' hands, besides having paid this year nearly 15,000*l.* in dividends. (Applause.)

Alluding to the question of the dues, Capt. THOMAS stated that Mr. Basset would have a fourth of the profit. The committee thought there was one hardship, and that was that when Mr. Basset came into the property, if he intended to make any alterations in the rate of the dues, he ought to have given them an intimation of it.

Mr. BOLDEN asked where the hardship was, and Capt. THOMAS replied that if Mr. Basset had intimated when he came into the property that he was going to alter the rate of dues they would have gone to him (Mr. Basset), and endeavoured to come to fresh terms that might have been better for the adventurers than what was now proposed.

Mr. BOLDEN could not understand where the hardship was, and Capt. THOMAS said that they had no chance to make fresh terms when Mr. Basset came into the property.—Mr. BOLDEN stated that they could make fresh terms, and he was happy to say that Mr. Basset was quite prepared to grant a new lease.

Capt. THOMAS: That is something worth talking about.

On the proposition of Mr. JOHN MAYNE, seconded by Mr. DAVEY, and carried unanimously, it was resolved to leave the matter in the hands of the committee.

A discussion then ensued as to the sales of tin, and Capt. THOMAS, in reply to Mr. Bolden, stated that it was their custom to sell to the highest bidder. During the past three months they had sold their tin to four different companies. He did not approve of public ticketing, nor, he thought, did anyone in the county.

Mr. BOLDEN said he was given to understand that the tin was sold to one of two gentlemen who were on the executive.—Capt. THOMAS said this was formerly done, and they would continue to do so to a certain extent.

A few other remarks followed, and the meeting was concluded.

D'ERESBY CONSOLS MINING COMPANY.

The ordinary general meeting of shareholders was held at the offices of the company, Gracechurch Buildings, Gracechurch-street, on Tuesday,—Mr. J. Y. WATSON, F.G.S., Chairman, presiding.

Mr. C. B. PARRY (secretary) read the notice calling the meeting.

The CHAIRMAN read the report of the directors, as follows:—

The accounts which have been audited show a cash balance in hand of 2063*l.* 15s. 9d., clear of every liability to the end of June. The operations at the deep level to get under the ore ground at the Cobbler's lode have not been attended, so far, with the results anticipated. The level has been driven 12 fms.; and continued as a branch or lode 10 fms.; but as the water is still in the old workings the directors are of opinion that the lode has not yet been reached. At Sutton's shaft some good lead has been found; the lode is worth ¼ ton per fathom, and this the agents hope will open out good lead ground between Owen's lode on the east and Cobbler's on the west of the shaft. Operations are, therefore, chiefly confined to this spot, and an intermediate level will be driven on the ore, both east and west, to intersect those lodes. This, at present, is the most prominent point in the mine, and it is hoped may result in success. It will be necessary at this meeting to elect a director in place of the late Mr. Daukes, and Mr. F. Braby is proposed.

The Chairman went on to say that he had always considered that when the Cobbler's lode was cut at the deep adit the water would come down, and enable the lead to be worked from the bottom of the old workings, from which so much lead had been taken, down to the water level; and the fact that these old workings were still under water seemed to him conclusive that the main lode had not been cut. The intermediate level, however, might throw light on this matter. Large quantities of lead had been raised from the sett down to the water level, but none below it.

Mr. NOAKES said that if there was only 1 in. of slate it would hold water.

The CHAIRMAN: My own impression is that it has never been proved below the water level.

Mr. F. BRABY said no doubt there was evidence that lead had been extracted from the bottom.—The CHAIRMAN said there was no doubt on that point; the deads on the top showed that a considerable amount had been worked.

Mr. F. BRABY asked whether any blende was being got at present?

The CHAIRMAN said not at present.

A SHAREHOLDER asked whether it had ever suggested itself to the directors that it was desirable to unwater the mine from the surface?—The CHAIRMAN replied that this would necessitate providing steam-power.

Mr. NOAKES said that the lode they were coming to seemed to be strong and well defined.—The CHAIRMAN said he did not believe that they had got the lode in the deep adit. The board had been as economical as they could in carrying on the works, and had been careful not to spend money all over the place. If in the D'Eresby Mountain Mine they got into a good course of ore in another month it would give fresh life to the D'Eresby Consols.

Mr. HERITAGE, in the course of some remarks, said he liked Capt. Sandoe and the system on which he worked—that of following a course of lead when he got one. Capt. Sandoe had done the same in Clementina, and it was satisfactory to know he was pursuing the same system here.

Mr. NOAKES also expressed his satisfaction with the mode in which Captain Sandoe was working the mine.

Mr. HERITAGE moved that the directors' report and accounts and the agents' report be received and adopted, and printed and circulated amongst the shareholders.—Mr. NOAKES seconded the resolution, which was put and carried.

Mr. F. BRABY moved the re-election of Mr. J. Y. Watson as a director. He said they were all aware of Mr. Watson's scientific attainments, and of his qualification to fill the chair of any company, and he was sure they would unanimously re-elect that gentleman as a director.

Mr. HERITAGE seconded the resolution, which was put and carried.

On the motion of Mr. HERITAGE, seconded by Mr. SPENCE, Mr. F. Braby was re-elected a member of the board.

Mr. F. BRABY, in acknowleging his election, said he had known something about the mine for some time. It was situated in a very interesting mineral district. There had not been elicited out of the D'Eresby Consols that value which was anticipated, but, of course, all works of this character require patience and perseverance. As far as he could judge from the reports, he believed the very best was being done to develope the property, and he hoped before long good results would be obtained.

On the motion of Mr. HERITAGE, Mr. Ashmead was re-elected auditor.

A cordial vote of thanks to the Chairman closed the proceedings.

ANGLO-AMERICAN AGRICULTURAL COMPANY.

A preliminary meeting convened by the Anglo-American Agricultural Company (Limited) was held at the Cannon-street Hotel on Thursday, for the purpose of explaining the advantages which the Western States of America offered to intending emigrants for forming home settlements, and the operations of the company in connection therewith. Mr. Alderman Hadley, who was to have occupied the chair, sent a telegram stating that he was detained in Manchester.

Mr. CLAPP, the manager of the company, then took the chair, and in alluding to the primary constitution of the company, said its capital was 1,000,000*l.*, in shares of 5*l.* each, which would be represented by 5 acres of the best freehold land, which would, of course, greatly increase in value by settlement: 200,000 acres of the cheapest and best land in Central and Southern Kansas were to be taken over, to be devoted to operations in stock-raising, grain-growing, &c. It was to be laid out in farms of 160 acres and upwards. There were 1000 improved freehold farms in the finest regions for stock-raising and grain-farming, which would be stocked and fitted with every requisite and necessary buildings, and handed over to the purchaser immediately upon a partial payment being made, and the remainder would remain payable by easy instalments, to be made from the produce of the rich lands. Another feature of the scheme was to train a limited number of agricultural cadets, who would be received and given a thorough knowledge of high-class farming. At the end of a term of two years the company would turn over to each cadet investing 1000*l.* an improved freehold farm of 480 acres, fully equipped and stocked, thus giving an admirable start in life to young men fond of agricultural pursuits. There was easy access to railway communication, so that there was every facility for sending the produce to market. The great natural advantages as to climate, fertility of soil, &c., and the great progress made in development, had been upon many occasions, recently touched upon by some of the English papers, and there were reports of visiting or pioneer parties amply verifyng every statement which the company put forward. He then stated, in reply to a question, that it was the intention of the company to furnish all emigrants with improvements, but not outfits or personal or household expenses. The man would be put in possession with all the necessaries for practical operations in agriculture, including barns, cattle sheds, and take from him partial payment at the commencement. The company also purposed establishing a large thorough-bred stock farm under the supervision of a well-known stock breeder. Mr. Alderman Hadley and Mr. J. K. Fowler, the well-known short horn breeder, would go out with the managing director early in October to make the final selection of principal tracts of land, and commence operations. There was a considerable number of farmers and others who would go out at the same time. Special facilities would be offered to those desiring to join early. The facilities and advantages for those with small capital were very great, both for securing good farms and profitable investment, while furnishing a safe and profitable employment for organised capital, as shown in the great success of the Land Mortgage Companies.

Sir JOHN BENNETT stated that he had been requested by Mr. Hadley to attend, and was unanimously voted to the chair. After some preliminary remarks, he said undoubtedly the great point for discussion was that of emigration, especially

when they were told, as he had been, that the English agriculturist was completely wiped out of the field. Last year 60,000 emigrants landed in New York in one month, and that number was likely to increase. Having alluded to the large quantity of meat and corn sent to this country by Montreal and other colonies, in vessels specially constructed for the purpose, he said there was nothing left for the agriculturist but to emigrate, as he could not remain here with the starvation wages of 12s. or 13s. a week, which was the ruling sum in his neighbourhood, Battle.—A VOICE: I can get them for 9s.

Sir JOHN said he did not care whether it was 9s. or 12s.; it was impossible to live and bring up a family on such a sum. It was just the same with the farmer. No farmer in this country could be sure of a tolerable living with the enormous taxes he had to pay. He could go into any country and get a farm for thee years rent free.

Dr. W. J. HARRIS, Col. F. T. LEDERBERGER, the Hon. Mr. BRANSCOMBE (late U.S. Consul at Manchester), and other gentleman, bore testimony to the fertility of the soil of the Western States of America; and after considerable discussion, at the suggestion of the Chairman, the discussion was adjourned to two weeks from that day.

A vote of thanks to the Chairman and Mr. Clapp terminated the proceedings.

FOREIGN MINING AND METALLURGY.

The week which has just elapsed has not brought with it any material change in the Belgian coal trade. Coalowners have not much to complain of at present in Belgium, but they would probably be pleased nevertheless if a few more orders reached them. The situation is generally not bad, and if stocks have begun to form themselves in the Hainaut, at Liége, on the other hand several collieries which had their yards encumbered with coal of all kinds are now completely free from stocks. Prices have not experienced any change. Supplies of coal for domestic purposes are not yet being laid in. Deliveries of coal are being made in France upon a somewhat important scale; this may appear rather unusual for the season, but last winter taught consumers some rude lessons, and they are now taking precautions accordingly. The temperature being still relatively high, prices have not experienced, however, any material change at present. A good autumn season is anticipated in the Austrian coal trade. In consequence of the good harvest which has been secured in Austria and Hungary the flour-mills have a good deal to do, and they are in full activity. The sugar manufacturing season is also about to commence in Austria, and the sugar-works promise to be valuable clients of the collieries this year. The German coal trade has not experienced any improvement.

A downward tendency in prices has again set in in the French iron trade. Merchants' iron has been quoted at 7*l* 8s. per ton, and ordinary plates at 10*l*. per ton. The fall in quotations has been stimulated by the action of a powerful company in the Centre group, which has shown a desire to relieve itself of the stocks which it has on hand. Pig for refining has been maintained in France at 2*l*. 12s. to 2*l*. 16s. per ton. Several adjudications of a certain importance have just taken place in France. In connection with an order for 8000 tons of steel rails a coalition was formed by some of the French steelworks, and prices rose to some extent in consequence; the Creusot Works abstained from competing for this affair. The Commentry Company obtained 4000 tons at 9*l*. 5s. 9d. per ton, and the Firminy Steelworks secured the remaining 4000 tons at 9*l*. 7s. 3d. per ton. These rails show an important advance when compared with the prices at which the Creusot Works obtained their last contract for steel rails. We may add that the Dombes Railway Company has let a contract to the Terrenoire Company for 5000 tons of steel rails at 8*l*. per ton. A contract for steel-plates has been let at 11*l*. 4s. per ton; the Creusot Company required 11*l*. 14s. 6d. per ton. Creusot has undertaken to supply 1800 tons of Bessemer steel tuyers at 14*l*. per ton.

The Belgian iron trade has shown some weakness. Prices at the same time have not varied materially. Notwithstanding the fall in English pig Belgian pig has maintained former quotations pretty well. This is, perhaps, due to the fact that many of the Belgian blast furnaces have their production engaged until the close of the year; hence they can afford to wait, and are not under the necessity of eagerly pressing sales. Ordinary Athus and Luxembourg pig is priced at 2*l*. per ton, while certain descriptions of Charleroi pig have made 2*l*. 12s. per ton. The Sclessin Company has obtained orders for 5000 tons of merchants' iron and girders, at an average of 5*l*. 8s. per ton for No. 1. What indicates the feebleness of the market is the low rates current at adjudications of iron for railways. Thus the Monceau-sur-Sambre Works recently tendered for fish-plates at 5*l*. 2s. per ton; the Acoz Forges Company also took a tender for bolts at 8*l*. 11s. 6d. per ton. Contracts have just been let for 45 locomotives for the Belgian State railways. MM. Carels Frères, of Gand, obtained an order for five six-wheeled coupled passenger engines, at 1847*l*. per engine. The St. Leonard Company, of Liége, obtained an order for three six-wheeled goods engines, at 1823*l*. per engine; and seven light passenger engines, with six wheels coupled, at 1450*l*. per engine, &c. The Belgian Metallurgical Company obtained an order for five ten-wheeled passenger locomotives, with tenders, for heavy inclines, at 2626*l*. per engine. The Marimelle and Couillet Company obtained an order for seven six-wheeled coupled goods engines, at 1823*l*. per engine. The Haine St. Pierre Company obtained an order for three ten-wheeled passenger locomotives, with tenders, for heavy inclines, at 2626*l*. per engine. The John Cockerill Company obtained an order for two six-wheeled coupled goods locomotives, at 1823*l*. per engine, and five six-wheeled coupled passenger locomotives, at 1847*l*. per engine; and the Belgian Company for the Construction of Railway Plant obtained an order for eight light passenger locomotives, at 1450*l*. per engine.

A report from Dortmund says that the general position of the Westphalian iron market remains unchanged. Most of the works are satisfactorily employed, especially the larger establishments, and new orders are coming in with tolerable regularity. The orders are, however, only sufficient to provide employment for the immediate future. There is still a steady demand for puddled iron, but some falling off is observable in the case of spiegel iron, foundry iron, and German Bessemer pig-iron; and the prices of the last named are weaker than they were recently. In the rolling works, including the Bessemer steel rail works, there is considerable activity, while merchant iron is in less demand than a short time ago. The orders for sheet-iron and plates are also becoming less numerous, and for these descriptions and for rod-iron prices are with difficulty maintained. There is an increasing demand for coal for both domestic and industrial consumption; but as the supply also continues liberal, prices have not yet shown an upward tendency.

GOLD MINING IN AUSTRALIA.—To judge by the mining statistics of the colony of Victoria, attention seems to be fixed principally on quartz mining as regards progress, though some of the gold fields are perplexed whether their future is to be associated with quartz or deep alluvial leads. The average earnings of miners for the past six years have been 89*l*. per annum, and, dividing the value of the gold exported and received into the Mint among the mean numbers of miners employed during 1879, the average per man is 76*l*. 1s. 2¼d. Out of 37,193 gold miners in Victoria 6487 are employed in the Sandhurst district, and 2710 in that of Ballarat. The approximate value of all the mining plant in the colony during the first quarter of the present year was 1,857,298*l*., the proportion credited to Sandhurst being 492,120*l*., by far the largest of any other district. The number of square miles of auriferous ground actually worked upon was 1241½, of which 160½ are in Ballarat, 341 in Beechworth, 143 in Sandhurst, 128 in Maryburgh, 164 in Castlemaine, 88½ in Ararat, and 216½ in Gipps Land. The number of quartz reefs actually proved to be auriferous was 3595, of which number Ballarat claims 347, Beechworth 873, Sandhurst 772, Maryburgh 613, Castlemaine 404, Ararat 80, and Gipps Land 506. The quantity of quartz crushed in Sandhurst during the quarter was 46,418 tons, producing 25,873 ozs. of gold, or an average of 11 dwts. 3 grs. per ton. In addition to this 990 tons of tailings yielded 2019 ozs. of gold. In the Ballarat district 42,735 tons of quartz were crushed for a gross yield of 17,810 ozs. of gold during the March quarter, and 52,205 tons during the June quarter, yielding 21,759 ozs., while the dividends paid were 15,700*l*. in March, and 32,988*l*. in June. The price of gold has varied from 3*l*. 19s. 6d. to 4*l*. 3s. per ounce. Altogether the prospects of the gold mining interest in Victoria are very encouraging. In the northern territory of South Australia there has been a great find by Chinamen of large nuggets at Port Darwin. Successive discoveries of nuggets, weighing 34 ozs., 72 ozs., and 120 ozs. hav raised the gold-finding fever to a high pitch, which was intensified by the unearthing of one of 19 lbs. weight. Within a very few weeks upwards of 30,000*l*. has been obtained from this "rush" on the Margaret river, and all by the Chinese.

LIST OF SMELTING, METAL EXTRACTION, ARSENIC, AND BARYTES COMPANIES IN THE UNITED KINGDOM, 1879.

(From the Mining Record Office Statistics.)

TIN.

Thomas Bolitho and Sons, Chyandour, Cornwall.
Williams, Harvey, and Company, Trethellan and Mellanear, Cornwall.
Daubuz and Company, Cavedras and Treloweth, Cornwall.
R. R. Michell and Company, Trereife, Penzance Cornwall.
Bissoe Bridge Company, Bissoe, near Truro, Cornwall.
Redruth Tin Smelting Company, Redruth Cornwall.
Calenick Tin Smelting Company, Calenick, Cornwall.
Charlestown Tin Smelting Company, Charlestown, St. Austell.
Penpoll Tin Company, Redruth.

COPPER.

Vivian and Sons, Hafod, Swansea.
Pascoe Grenfell and Sons, Middle Bank, Swansea.
Nevill, Druce, and Company, Llanelly.
Williams, Foster, and Company, Swansea.
Mason and Elkington, Pembrey.
Copper Miners' Company, Aberavon.
Charles Lambert and Company, Port Tennant, Swansea.
The British and Foreign Copper Company, Liverpool and St. Helen's.
Newton, Keates, and Company, St. Helen's.
Baxter and Company, St. Helen's.
Bibby, Sons, and Company, St. Helen's and Liverpool.
W. Roberts, jun., St. Helen's.
James Keys and Son, Whiston Works, Cheadle, Staffordshire.
Sweetland, Tuttle, and Company, Swansea.
Ravenhead Copper Company, Liverpool.

LEAD.

Bewick and Partners (Limited), Hebburn, Newcastle-on-Tyne.
Nevill, Druce, and Company, Llanelly.
Runcorn Smelting Company, Runcorn.
The Panther Lead Works, Bristol.
Blackworth Lead Works, Bristol.
Weston, Sons, and Company, Bristol.
Cookson and Company, Howden, Newcastle-on-Tyne.
Locke, Blackett, and Company, Wallsend-on-Tyne.
Executors of Jos. Dinning, Haydon Bridge.
Vivian and Sons, Swansea.
Enthoven and Sons, London.
Lock, Lancaster, and Company, London.
Pontifex and Wood, Farringdon Works, London.
Logan Edward, Birkenhead
Par Lead Smelting Company (C. Remfrey), Par, Cornwall.
Peter Glover and Robinson, Widnes Lead Works, near Warrington.
White Rock Works, Swansea.
St. Helen's Lead Smelting Company, St. Helen's.
Adam Eyton, Llanerchymor, Holywell.
The Cambrian White Lead Company, Brymbo, near Wrexham.
Joseph Walker, Parker, and Co., Dee Bank, Bagilt, and Newcastle.
Governor and Company of Lead Smelters, Nenthead, Alston Moor.
" " " Stanhope, Durham.
W. B. Beaumont, Allendale, Northumberland.
" " Rookhope, Durham.
Mill Dam Mining Company, Bakewell.
Joseph Wass and Son, Lea Lead Works, Matlock Bath.
" " " Alderwasley.
J. Fairburn and Company, Middleton Dale and Bradwell.
Snailbeach Lead Company, near Shrewsbury.
Pontesbury Lead Works, Minsterley, near Shrewsbury.
T. H. Moore Brough Works, Hope, near Sheffield.
E. Backhouse, Darlington.
Greenside Mining Company, Penrith.
The Keld Head Mining Company, Wensleydale.
John York, Pateley Bridge.
Duke of Devonshire, Grassington.
The Duke of Buccleuch, Wanlock Head.
The Lead Hills Mining Company, Lead Hills.
Lister, Robinson, and Company, Grinton Moor.
The Arkindale Mining Company, Arkengarthdale.
The (A.D.) Lead Company, Blakethwaite.
R. Milner and Company, Belde Hill.
The Swaledale Lead Company, West Swaledale.
Sir G. W. Denys, Bart., Surrender, Swaledale.
Charterhouse, Blagdon, Mendips, Bristol.
Waldegrave Lead Smelting Company (Limited), Mendips, near Wells.
The Mining Company of Ireland (Limited), Dublin.

ZINC.

Bagilt Zinc Company.
Vivian and Sons, Swansea.
William Marsden, Oldland Hall, near Bristol.
Kenrick and Son, Wynn Hall, Spelter Works, Ruabon.
Charles Titterton, Phœnix Zinc Works, Warrington Junction.
Dillwyn and Company, Swansea.
J. Collingborne, Spelter Works, Warmley, Bristol.
Joseph Thompson, Spelter Works, Carlisle.
Ryland Brothers, Warrington.
Richardson and Company, Swansea.
Crown Spelter Company.
Villiers Spelter Company, Morriston, Swansea.
Swan and Company, Maryhill, Glasgow.
Swansea Vale Spelter Company (Limited), Swansea.

PYRITES PRECIPITATE COMPANIES.

Duncan McKechnie, St. Helen's.
The Widnes Metal Company, Widnes.
The Tharsis Sulphur and Copper Company, Widnes.
" " " Hebburn; Newcastle.
" " " Birmingham.
" " " Glasgow and Cardiff.
N. Mathieson and Company, Widnes.
The Runcorn Soap and Alkali Company, Runcorn.
Wigg Brothers and Steele, Runcorn.
Newton Heath Copper Smelting Company, Manchester.
Muspratt Brothers and Huntley, Flint.
William Russell and Company, Newcastle.
The Bede Metal and Chemical Company, Jarrow, Newcastle.
W. Hunt and Sons, Leabrook, Wednesbury.
William Hunt, Brother, and Co., Castleford.
Harrison, Blair, and Company, Kearsley, Bolton, Lancashire.
Henderson and Company, Irvine.
H. Hills and Sons, Newcastle.
Eyton Copper Company, Mostyn.
Morris and Company, Doncaster.
W. D. Pochin and Company, Newcastle.
South Devon Metal and Chemical Company, South Down, Devonport.
H. G. Lord and Company, Calstock.
Holmbush and Kelly Bray Company, Callington.
Gibbs, Jackson, and Company, Newcastle.

ARSENIC.

Cornwall Arsenic Company, Hayle and Bissoe Bridge, Thomas Willis Field, Managing Partner, Marazion, Cornwall.
Devon Great Consols Mining Company (Limited), Tavistock.
J. B. Drayton and Company, Harrowbarrow, Callington.
English Arsenic Company, Roseworthy, Gwinear, Cornwall.
Palmer and Hall, Morriston, Swansea.
A. C. Hadland, Swansea.
Plympton Mining and Arsenical Company (Limited).
Okel Tor Arsenic Works, Calstock.
J. Paynter and Trythall, Bissoe Chemical Works, Devoran, Truro.

BARYTES MANUFACTURERS.

Blackwell, George G., Garston, Liverpool.
Pegg, Harper, and Company, Derby.
Ellam, Jones, and Company, Derby.
Stevens Brothers, Matlock Bath.
C. H. Garton, Lumsdale, Matlock Bridge.
Wm. Hawley, Bonsall, near Matlock Bath.
E. Brown, Bonsall, near Matlock Bath.
Hegginbotham, Stoney Middleton, near Sheffield and Whaley Bridge.
Middleton Dale Barytes Company, Stoney Middleton, near Sheffield.
White and Company, Chapel-en-le-Frith, near Stockport.

NICKEL AND COBALT.

H. Hussey Vivian, M.P., Swansea.
Stephen H. Barker, Birmingham.
Henry Wiggin and Company, Birmingham.
W. Webb and Company, Aston, near Birmingham.
Sir J. Mason, Bromford, Birmingham.
J. H. Williamson, Stoke-upon-Trent.
Rawlins and Son, Liverpool.

GOLD AND SILVER REFINERS.

Vivian and Sons, Swansea.
Johnson, Mathey, and Company, London.
Brown and Wingrove, Wood street, Cheapside.
M. Rothschild and Co., Royal Mint Refinery.

SILVER ORE SMELTERS.

Vivian and Sons, Swansea.
Nevill, Druce, and Company, Llanelly.
Raphael and Company, Thomas street, Limehouse.
Sheffield Smelting Company, Sheffield.
E. W. Oates and Co., Sheffield.

TREATING WASTE OR SCRAP TINNED IRON.—The waste is, according to the invention of Mr. B. BIGGS, of Laurence Pountney Hill, dissolved in sulphuric acid, hydrochloric acid, nitric acid, or other suitable acid, or partly in one acid and partly in another acid; and he then precipitates the tin from the solution by means of sulphuretted hydrogen, and removes the precipitate (sulphide of tin) and dissolves it in hydrochloric acid, and then precipitates the tin from the solution with zinc; or he evaporates and crystallizes the solution of chloride of tin. After removing the precipitate of sulphide of tin from the solution of tin and iron, he adds to the remaining solution ammonia or carbonate of ammonia in the form of vapour or otherwise. This he prefers to do by distilling ammoniacal liquor (gas liquor), and passing the vapour or the distillate into the said solution, the vapour from the said ammoniacal liquor being purified before condensation by passing it through lime or oxide of iron or in any suitable way. The greater part of the iron is thus precipitated in the form of oxide or carbonate, and the ammonia combining with the acid forms sulphate, or muriate, or nitrate, or other salt of ammonia, according to the acid used. He then removes the precipitate, and if it be not in the form of a peroxide of iron he converts it into a peroxide by exposing it to the action of the atmosphere, and if the said peroxide be required in an anhydrous form he heats it either in crucibles or in a suitable furnace. The hydrated oxide is in a form suitable for use in the purification of coal gas. In the anhydrous form it is suitable for use in polishing glass or other substances, or as a pigment. In order to precipitate the iron remaining in the solution he adds to it sulphide of ammonium, and removes the precipitate, which is a sulphide of iron, and may be used for purposes for which the sulphide of iron is employed. The remaining solution is a salt of ammonia corresponding to the acid used, and this he concentrates or crystallises in order to bring it into a marketable state. In treating ordinary untinned scrap iron he dissolves it in a suitable acid, and treats the solution as hereinbefore described with respect to the solution of tinned iron after the removal therefrom of the precipitate of tin.

SIR HENRY BESSEMER.—The ceremony of presenting Sir Henry Bessemer, F.R.S., with the freedom of the City of London will be held at Guildhall on Wednesday, Oct. 6, and the Lord Mayor will entertain him at dinner at the Mansion House the same evening

CHEMICALS, MINERALS, AND METALS.—Messrs. J. Berger Spence and Co. (Sept. 15).—Alum: Loose Lump, 6*l*. 7s. 6d.; ground, 7*l*. 5s.—Arsenic: Best white powdered, 11*l*.—Bleaching Powder, 5*l*. 12s. 6d.—Borax: Refined English, 60*l*.—Copperas: Green, 45s.—Copper: Sulphate, 21*l*. 10s.—Nitrate of Lead, 29*l*.—Nitrate of Soda: 14s. 9d.—Potash: 10½d.—Soda: Cream Caustic, 8*l* 15s.—Sulphate of Zinc, 12*l*.—Sulphur: Roll, 9*l*.; flour, 12*l*.—Tin crystals, 6¾d. per lb.—White lead, 21*l*. 5s.—Brimstone: Best thirds, 5*l*. 15s.—China-Clay, 39s.—Ochre, 5*l*. 15s.—Oxide of Zinc, 25*l*. 10s.—Talc, 5*l*.—Umber, 50s.—Copper: Best Ingot, 61*l*.; seconds ingot, 60*l*.—Lead: Best soft English, 16*l*.—Pig-Iron, No. 4 Forge, 39s. 6d.—Spelter, 19*l*. 10s.—Tin: British common block, 87*l*.—Naphtha Miscible, 4s. 6d.

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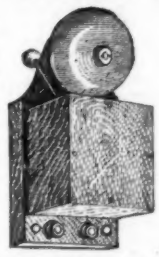
AND OTHER APPARATUS FOR MINES.



Prize Medal - - - - - - London, 1862.
First Prize - - - - - - Sydney, 1879.

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TECHNICAL AND ACADEMIC EDUCATION.

Although several efforts have been made to satisfy the desire of the superior class of industrials—of those who are hereafter to have the control of our mines, our factories, and our engineering works—for increased scientific knowledge by establishing schools of mines, of science, and of engineering, the success of these establishments has been but very partial, and students who have attended them have not been those who were likely to profit most from the instruction given, nor those who were likely to reflect the highest credit upon the establishments themselves. Just as working men's educational institutes have been attended by clerks and neglected by artizans, so technical schools—in this country at least, for the observation does not apply to similar institutions on the Continent—have been attended by luckless young fellows, who entertain the erroneous opinion that school knowledge can be made a substitute for that inestimable valuable experience obtainable only by practice. The needy gentleman sends his son to a technical school, although he would consider it degrading to permit him to submit to what should be the accompanying education—actual labour in the workshop, in the factory, or in the mine—and hence it is that with by far too many employers the diploma of a technical school or a science certificate is regarded as the opposite of a recommendation. They do not fear that the diploma has not been earned, but assume, judging by comparison with men whom they have met, that all who seek such diplomas are unfitted for a place of business. Added to this there is the great drawback that in popular opinion the graduate of a technical school does not rank equal with the graduate of a university, although the pass in the former case may have involved much more laborious study. An Associate of the Royal School of Mines, for example, may have studied quite as hard as the candidate for Doctor of Science at London—indeed several have really taken the Associateship and the Degree almost in the same session—but there are none who can say that in the world the Degree has not secured them the greater respect.

Now, there is at present the complaint that the old class of men who were included in the general designation of civil engineer at the beginning of the century are dying, or have already died out, and that neither the Mining Schools, the Schools of Science, nor the Universities are replacing them by any equally useful species of humanity, and it is feared that the result will be that we shall lose the high reputation for sound practical judgment which we so long enjoyed, so that the discovery of a remedy is most desirable. It would appear that for the higher class of technical professionals we must have men of actual practical experience, with such an academic rank as is indicated by a degree in science to afford evidence that they have sound general knowledge to assist that experience. This combination of science and practice could probably best be attained by adopting the principle of articling aspirants to professional men actually practising their profession, and introducing a clause in the articles providing that the student shall be permitted and required to attend science lectures during four months of each year—the articles not being regarded as completed until a degree in science has been obtained. For this purpose the London science curriculum would scarcely be useful, but at present the facilities for railway travelling are so great that in whatever part of Great Britain the student might be located the Scotch universities could be both cheaply and conveniently attended. The degree of B.Sc. can be obtained in the University of St. Andrews, for example (which is the oldest in Scotland, and has a large and efficient professorial staff), in three years, and the D.Sc. in four years, whilst the possession of either degree would be conclusive evidence of the possession of all the scientific knowledge which the holder would be likely to require in his professional career.

The practical education which the student would receive would, of course, vary according as he had been placed in the office of a mining engineer, or of a civil engineer, or in the works of a chemist, metallurgist, or manufacturer; that is to say, he would arrange the optional part of his university studies accordingly; and the science curriculum of the University of St. Andrews may again be referred to in order to give an idea of the work to be done, and of the utility of doing it. Assuming that the student does not already possess a university degree, he will in the first place be required to pass a preliminary examination in English, Latin, Arithmetic, the Elements of Mathematics, and in the least two of the following subjects—Greek, French, German, Higher Mathematics, Natural Philosophy, Logic, and Moral Philosophy. Of these optional subjects it would no doubt be to the interest of the professional student to take higher mathematics and natural philosophy, as by that means he would obtain an insight into the style of the professor's teaching, and thus profit more largely from the subsequent lectures which he will hear on the same subjects. This examination is not an excessively stiff one, but is ample to exclude from the lectures leading to the degrees all students who are insufficiently prepared to be enabled to appreciate them. The first B.Sc. examination is compulsory, and demands a general knowledge of mathematics, natural philosophy, chemistry, zoology, geology, and physiology, this general knowledge representing so complete an outline that the student who possesses it is not likely thereafter to be at a loss. It is not difficult to observe that the object up to this point is to exclude from the degrees all but those who are entitled to be regarded as well educated.

Henceforward the object is to induce the student to acquire high rank in some particular branch of science, by concentrating his efforts to the attainment of a particular object; the candidate must therefore, for the final or Second Bachelor of Science examination profess one, not more than one, of five distinct groups—(*a*) higher mathematics and natural philosophy; (*b*) experimental physics and chemistry; (*c*) chemistry and geology; (*d*) physiology, zoology, and palæontology; and (*e*) physiology, botany, and geology. Graduates of Arts of St. Andrews, with first class honours in mathematics, or in natural sciences, are exempted from this examination. Should the B.Sc. desire to proceed to the degree of D.Sc. he may after the lapse of 12 months present himself for the third or Doctor of Science examination, for which he must profess one, and not more than one, of the subjects belonging to the group in which he proceeded to the degree of B.Sc.; and he must further profess some special branch of that subject to which he has devoted special attention, and in which he believes himself to have attained special knowledge. He must also present a thesis embodying some original researches on the subject of his intended examination, and this must be approved by the examiners. Should the candidate satisfy the examiners that he has obtained this thorough knowledge of his subject he may be recommended to the Senatus for the D.Sc.; and it might have been added that when he receives it few will dispute that he has earned it. The fees, however, are but 10*l.* 10s. for the four examinations.

The professional man will probably find the B.Sc. ample for his purpose, and a glance at the syllabus will suffice to show that the St. Andrews B.Sc. will be able to hold his own against graduates of similar rank in any university in the kingdom. The mathematics for the first B.Sc. embraces the first six books of Euclid, and the first 21 propositions of Book XI.; geometrical conics, elementary trigonometry, elements of analytical conics, and elementary algebra, including progressions, surds, binomial theorem, &c. Natural philosophy is subdivided into applied mathematics and experimental physics, the former including kinematics, abstract dynamics, geometrical optics, and plane astronomy; and the latter the laws of motion, properties of matter, sound and harmonics, light, heat, and electricity, and the conservation of energy. The chemical section embraces a comprehensive and practically useful outline of the elements of inorganic chemistry, including crystallography, and the study of the properties of acids, bases, salts, &c., industrial chemistry, metallurgy, and the classification of organic compounds. The zoological section includes systematic palæontology, and is treated with sufficient completeness to enable the candidate to refer to its proper group specimens exhibited by the examiners for that purpose. Geology, which includes historical palæontology, is subdivided into physical geography, physical geology, and historical geology, each of which is very fully dealt with. And physiology is so treated that the candidate is prepared for an examination which demands a sound general knowledge of the character and functions of the several systems which go to make up the marvellous whole.

The whole of the subjects already mentioned being compulsory, and constituting only the first part of the two examinations which have to be passed to entitle the candidate to the B.Sc., it need not be said that degree is of real value as evidence of the possession of a wide range of sound general knowledge, as well as a considerable amount of special knowledge of great intrinsic value in a professional point of view; and when it is supplemented by regular training under the guidance of a professional man, with large practice, it is difficult to conceive what more could be required to keep up the supply of men of the quality already mentionod as being in request. This combined training was indeed precisely that which produced Robert Stephenson, and numerous others of the same time and class, and if it be still encouraged and adopted there need be no fear that we shall have plenty of men who may with the utmost confidence be entrusted with any technical engineering work, however difficult or however important, and who will acquit themselves with equal credit to themselves and to those who have instructed them.

THE YORKSHIRE COLLEGE

The Calendar for the seventh session—1880-81—has just been issued, and shows that the institution is making satisfactory progress. The College is increasing its teaching staff, and from the lists of students who have obtained honourable distinction in the various subjects, and of the entries in the day and evening classes, it is evident that the interest taken in the subjects taught increases. In mathematics and physics, chemistry, geology, coal mining, biology, engineering, modern literature, Hebrew, and textile industries, the numbers are all larger—sometimes to the extent of over 50 per cent. The decline from 57 to 46 in classical literature and history is represented by the discontinuance of the Saturday morning class, which was attended by 10 in the previous year. The French entries are 15 against 16, and the German entries are 29 against 41; but whilst last year 33 attended two short courses for German literature, this year 18 attended throughout the session. In the aggregate 696 were entered in the day classes last session, against 543 in the previous one. In the evening classes the increase has been from 142 to 163, so that the total was 859—a number which cannot but be gratifying to all concerned. The textile industries and dyeing departments have now been removed to the new buildings in College-road, and it may be hoped that ere long the whole of the departments of the College will be located there.

The abolition of the library fee will be generally appreciated by students, registration now conferring the privilege to use the library as long as the student remains in the college. A reading-room is also to be ready for the use of students by the first day of term. The several courses appear to have been carefully arranged, so as to afford the necessary preparation in the subjects required for the London University Matriculation and Science, Arts, and Medical degrees; for scholarships at the Universities, and for various professions. Special classes have also been formed for the Cambridge local examinations, and students who cannot afford the time to follow a regular course of education in the classes for registered students may attend afternoon or Saturday morning lectures and classes in various subjects. The Art side of the College is all that need be desired for obtaining a sound general collegiate education, and the Technical side has, without question, been arranged with much judgment to provide very amply for the requirements of those for whose especial advantage the establishment was designed. In mathematics there are three classes for registered students, and one on Saturday mornings for teachers and others. In experimental physics two series of lectures are given—a first and a second year's course, comprising mechanics, optics, heat, acoustics, light, electricity, and magnetism. The physical laboratory is open three days in the week for instruction in the methods of performing physical experiments. There are lectures in inorganic and organic chemistry; there is a class for laboratory practice and chemical calculation; Saturday classes (lectures and laboratory) are open to persons who can only spare a short time for study on this subject; and in the chemical laboratory, open daily from nine to five o'clock, students are instructed in chemical analysis; they make original investigations, and do other practical work. The teaching of matters connected with the textile industries and dyeing gives employment to a special department, and there are plenty of biological lectures, &c., for those desiring them.

But the geology and mining curriculum is that in which most interest will be felt by readers of the *Mining Journal*, and these will be gratified to learn that this has been extended to meet the requirements of those who, having passed successfully through the first year's course of instruction, wish to devote special attention to particular subjects. These, together with the coal mining lectures, which are intended to prepare candidates for colliery certificates, afford those who are intended for responsible positions in mining the opportunity of qualifying themselves for such posts in the best possible way. The professor of civil and mechanical engineering holds classes in field work, construction, and mechanism, to which is now added geometrical and mechanical drawing, and some of the leading engineers and manufacturers of the district have given permission for college engineering students to occasionally visit their workshops. In the same way the students of the coal mining department make excursions to collieries, through the courtesy of various coal proprietors. The examination papers have evidently been prepared with much care and judgment, and it cannot be doubted that no student would be likely to satisfy the examiners upon them unless he possessed an amount of knowledge which would be extremely useful to him in after life. Indeed, all connected with the Yorkshire College may well be congratulated upon the useful work they are doing.

CLASSIFYING MINERALS.—The apparatus invented by Mr. W. NANCE, of North Shields, consists of a series of pans of different diameters, and of any shape or size or kind of material, placed in a vertical or diagonal position, and is especially intended to separate minerals and metals from their gangue, and at the same time in the same operation to classify any number of metals or minerals of different specific gravity which may be associated therewith. For instance, if two or more metals or minerals of different specific gravity be operated on in this apparatus they will be separated from their gangue, and deposited in receptacles specially provided for the reception of each kind. The operation consists of a series of hydraulic currents in the said pans, to which the ores are submitted, and the said currents therein can be regulated to suit every difference of specific gravity whereby an indefinite number of different specific gravities is obtained in one operation without manual labour, mechanical motions, or power, other than a slight fall of water to produce the currents. By the use of this apparatus and method of treating ores considerable less space is required for the mechanism and modes of operation, and a greater quantity of ore is treated in a given time than by the mechanism at present in use.

THE BEAUMONT COMPRESSED-AIR LOCOMOTIVE.—There was a trial of one of Colonel Beaumont's compressed-air locomotives on the tramway of the Leeds Tramways Company's line, between Hunslet and Wortley, on Wednesday. This engine differs only in some matters of arrangement from one tried several months ago at the works of Messrs. Manning and Wardle, at Hunslet, where both have been made. The cylinders for the compressed air are enclosed in a strong boiler-shaped framework, placed horizontally, and the whole machinery is so protected from view as to give the engine a very neat and compact appearance. The locomotive was charged with air giving the enormous pressure of 1000 lbs. to the square inch, and with this power it started with one of the heavy cars from the Hunslet terminus. When it arrived at Boar-lane, the air-pressure had been reduced to about 700 lbs. on the square inch. It proceeded as far as the Crown Inn, at Wortley, and by that time the gauge showed about 500 lbs. pressure. There was some shunting necessary at that point, but the remaining pressure sufficed to take the engine and car back to the Hunslet terminus. The engine ran with remarkable steadiness, and was perfectly under the command of the driver. It was quickly stopped, and easily started. Although there is a small boiler for getting up steam to heat the air cylinders, yet no smoke or steam was emitted, and it is thought that there will be no difficulty in getting rid of a snorting noise sometimes caused by the exhaust air when stopping or starting. The streets through which it passed were busy with traffic, but only now and then a horse was met with whose attention was attracted by the unusual appearance of the engine. The trial was witnessed by the inventor, Colonel Beaumont, and by Mr. Turton, chairman of the Leeds Tramways Company, and other gentlemen, and the engine will probably be set to work next week on one of the Edinburgh lines. A new style of car is also being built, which will combine engine and car, so constructed that the former can be readily detached should that any time be necessary.

MINING IN CORNWALL—1880.

BY MINERO.

MINING LABOUR SYSTEM.

Tutworkmen are simply excavators paid at a fixed rate per fathom. Their undertaking is to bring to the surface so much material, whether ore or mere stuff, at the agreed price. Such men are necessarily the first labourers in a mine, as they sink the shafts and drive the levels. They form a party, or gang, consisting of several persons, and each party is divided into three gangs, each gang working eight hours at a time, the whole number thus taking their turns in the twenty-four hours. The price at which they are set to work is the only subject of dispute. The work is given out by the agents of the mine at a price per fathom, which the men are to bid for; the contract is for one month. They bid with a real or supposed knowledge of the nature of the ground, and the party offering to take it at the lowest price secures the work. To fulfil their task they require the use of machinery to raise the excavated matter to the surface, and they are allowed to use the machinery on the ground at a certain rate of charge, to be deducted from their earnings. Other deductions are made for candles, powder, safety-fuse, smiths' costs, &c.

The tributers do not work for fixed wages of so much per fathom, but become, by a peculiar arrangement, partners of the mine as regards the portions or pitches which they respectively undertake. The pitches are the rectangular portions into which the part of the mine containing the lode is divided. The method of arranging the excavation of these is as follows:—A mine has its regular setting-day, on which the captain of the underground work meets the tributers at a fixed time and place. A mining auction now takes its course, the captain acting as auctioneer and partly as appraiser. Particular pitches are named and put up by the captain. The tributers who form the bidders have, it is presumed, studied the character and metallic prospects of each pitch, and their knowledge and skill are now brought into exercise and competition. They are now about to agree to get the ores in the pitch in question, to break them, to raise them to the surface, and pay for the whole process of dressing them, if required, and bringing them into fit condition for the smelter.

It is evidently the object of the captain to set each pitch at the lowest price, so that his aim is the reverse of that of an ordinary auctioneer; and, as the captain represents the proprietors, his interest is to secure the extraction of the ore at the smallest possible cost. The tributer will bid in proportion to his idea of the richness or the poverty of the pitch put up; if rich in metal his labour will, of course, be less than if poor, and his reward greater. Quality and quantity of metal will regulate his offer. For example, he may offer to work the pitch put up if rich in ore at 5s. in 1*l.*—that is to say, 5s. deducted from every pound's worth of ore raised to the surface, such being his tribute, and being his tribute, and hence the name of tributer. If the pitch seem poor in ore he may not take under 13s. in 1*l.*, and the prices offered vary from 1s. to 13s. in 1*l.* The whole setting is generally arranged without much difficulty or difference. The pitches are set in this manner for two months at a time.

When the tributer proceeds to work in the manner previously described he discovers the value of his bargain. If he finds the pitch much poorer than he expected two months will terminate his bad bargain; if much richer two months will terminate the bad bargain of the captain. If the tributer finds his pitch to turn out extremely poor he may throw up his agreement at the end of one month or previously by paying a fine of 20s. The preference is given to men best known and longest established in the mine. There are great and mutual advantages in this plan of conducting and raising of ores; and although the tributers are often disposed to complain, yet it may be doubted if any other equal beneficial and equitable mode of carrying on the work could be devised. It is the tribute system which is the great improvement in the economy of mining; it has prevailed in Cornwall for some time, but it is of late years that it has been perfected. Its essential character is that it identifies for a time the interest of the workman and his employer.

The business of mining is one of constant research and of experiment, and the greater portion of skill and intelligence you can enlist into the service the better the chance of success. If you can call the thought and observation of numbers of persons daily interested in minute investigations to the aid of the captain, a powerful instrument is placed in his hands to work for the gain of the adventurers. The tribute system does this, and it has been doubted whether many of the mines in Cornwall could be continued to work were it abandoned.

It is difficult to ascertain the exact time at which this system of working on tribute was introduced. It was in force when Jars travelled in Cornwall, in 1765. The period, however, for which the pitches were then taken was four months instead of one or two, as at present. He described the extent of a pitch as being commonly from 15 fms. to 24 fms., and for a period of half-a-year, a whole year, or even for seven years, as was the case at Bullen Garden, and the means of that mine's discovery.

LABOUR SYSTEM OF 1800 SAID TO BE WORKED OUT IN 1880.

At a mine general meeting a mine manager complained very much of laziness on the part of the Cornish miner. The question with many of them was how little could be done, and their great consideration was how to deceive the agent. He believed their present system, although it might have answered very well in years past, was now worked out. He should like to see a new system adopted, by which any man who worked should be paid well for his labour. He suggested that they should have gangers, and set the men to bore so much ground at so much a foot or so much an inch. He was quite prepared at any moment if a better system were adopted to do all in his power to carry it out. Then let a man go round to blast the holes, and see that they were properly bored.

An adventurer said the point was to have some agents to carry the suggestion into practice.

Several shareholders expressed an opinion that the present supervision was inefficient for the good working of the mine.

SAYINGS OF THE TUTWORKMEN.

The price that men get for spending a fathom of ground depends on what they earned last month. For instance, if four men got 18*l.* last moth—that is, 4*l.* 10s. each—their price must be reduced, simply because the agents think it too much for a man to get. Certainly the agents cannot say whether the men have worked or idled, because they seldom see them working, consequently cannot tell how time is spent while underground. The agents do not judge the ground to be broken, and give a price accordingly, but according to past earnings. Now, this is one reason why miners idle their time, because if they work hard to get a tidy living they are sure to be reduced in price the next month. There are better prices for labour given in Cornwall than in America, but in Cornwall you must only get so much a month, consequently it is of no use to work hard. "Allow us to work in Cornish mines as we do in America, and we would not go out of Cornwall. Give us a chance to earn, and then we shall not want to idle away our time."

MEMORANDUM *re* MINING LABOUR.

At a meeting of the Mining Institute of Cornwall a managing mine captain stated "it was his firm conviction that their men did not work in their places four hours per day. He knew this to be a fact; and furthermore he thought that in many of their mines the men did not exceed four hours a day in their places." A remedy in this matter would be for the managing captain to measure the work roughly every Saturday preceding the monthly measurement for charging pay-day account. Six men in a pare, working three cores of eight hours each, would take out candles for 48 hours' work in the

week. If they work only four hours each core one-half of their candles is a dead loss to the adventurers; also the time of landers, fillers, and other owners' account people employed to prepare tools, with other work for contract tutworkmen.

In looking over cost-boot "tutwork charge" it is useful to examine the amount for each pare separately—say a charge for six men driving an end. Reduce the charge from six men to one man for the month, for the week, for the day. This reduction will be correct legitimate data as to one man's daily labour, with gettings allowed.

In some mines, with fixed gettings, the men have 33 per cent. added the candle, &c., charge above the cost price. If this charge on being deducted from the labour charge does not leave a balance equal to the gettings allowed, then sundry charges are added to the labour charge to make the balance required. This called "profit on the men's material" throws up the gross labour charge 33 per cent. It is an ancient mode of mystifying cost-book accounts, and ought to be abolished.

A mining captain is not engaged as an engineer, but for the special purpose of superintending the exploration of rocks in search of minerals, and to see that the tinners do proper labour; also to carefully measure such work, and plot it, studying if he has all the lode in sight, and if it is the real lode he expected. In truth, the captain is engaged as a miner, and not as an engineer On neglecting his proper duties he inflicts a heavy loss on his employers. The miners, for want of efficient superintendence, waste one-half of their time and materials. The absence of discipline doubles the working charges in Cornish mining. The work of the captain and his underground charges are seldom subjected to audit.

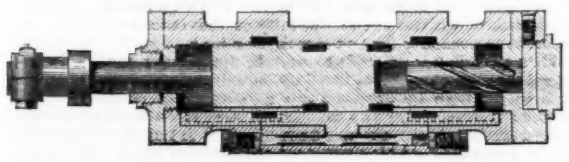
It is impossible to deny that laxity of supervision is the bane of Cornish mining enterprise. The private trader, having only himself to depend upon, is obliged to watch carefully the economy of his establishment.

Anciently it was usual to rate wages, firstly by general laws extending over the whole kingdom, and afterwards by particular orders of the Justices of Peace in every particular county. By the experience of 400 years, says Dr. Burns, it seems times to lay aside all endeavours to bring under strict regulations what in its own nature seems incapable of minute limitations, for if all persons in the same kind of work were to receive equal wages, there would be no emulation, and no room left for superior industry or ingenuity.

Uniformity of wages or gettings, irrespective of the personal abilities of the workman, is obviously unjust to the more capable and skilful miner. It places the ablest and most industrious upon the same footing with an ordinary workman.

"Piece-work is the perfection of contract, and contract in all work and in the most minute detail—the principle of so much pay for so much work, carried out to the utmost extremity—is the system of all others, in the present state of society and degree of civilisation most favourable to the worker, though most unfavourable to the non-worker who wished to be paid for being idle." Daily wages are no criterion of the actual cost of executing work, and it is quite possible that work may be more cheaply executed by the same workmen, notwithstanding that their wages have been largely increased. All experience shows that, with proper supervision and with an equitable mode of setting contracts, the best paid workman does more work for a given sum of money than the underpaid, and, therefore, underfed, labourer can by possibility accomplish. High gettings do not necessarily imply dear labour, just as, on the other hand, low wages do not of necessity make labour cheap.—*West Briton.*

A PRACTICABLE VALVELESS ROCK-DRILL.



The skill of a great many able mechanics and engineers, and a great deal of capital, have been employed in simplyfying and perfecting machinery for drilling purposes, the principal object being to avoid breakages, which are far too common in the ordinary machines. It has been fonnd by actual observation that where any great amount of work is being done it requires six drills to accomplish what should be done by four on account of the loss of time occupied in repairing broken parts. In former machines the parts most liable to breakage were the valves, and as no modification of their construction has has been sufficient to give them a durability which compares with that of other parts of the engine, the difficulty in many cases seems wholly irremediable, and the only recourse is to have a sufficient supply of duplicate parts on hand to be ready for emergencies.

Notwithstanding the many failures, mechanics and engineers, appreciating the immense benefits to be derived in case of success, have pluckily continued with their experiments. As valves could not be made sufficiently durable, the line of experiment naturally tended in the direction of valveless engines. These were known to be perfectly practicable in some respects, while in others, more particularly in the displacement of the compressed air or steam at the ends of the cylinder at the termination of the stroke, and giving a cushion for the piston to prevent severe concussion with the cylinder heads, the problem has remained unsolved until now. Mr. S. Bryer, of Saugus, Massachusetts, who has had an experience connected with rock drills of over ten years, after much experiment, has devised the drill, of which the above engraving is a sectional view, and which the Scientific American, from which this description, regards as the only thoroughly practicable valveless engiuess for a rock drill yet made. The piston of this drill is its own valve, thereby dispensing with the small valves and their consequent wear and breakage, together with many other small and weak parts common to other drills. As will be seen by reference to the engraving, it has fewer parts than any other rock drill in the market. Practically, there is nothing but the cylinder, the piston, and the rotating motion, which is perfectly simple and scarcely exposed to wear or breakage. The blow delivered is as positive and effectual as that from any other style of drill—a result which has never before been obtained with a valveless engine.

The advantages of this drill consists in such an arrangement of parts as to entirely obviate the use of tappets, valves, or other auxiliaries depending for their action upon percussion; while it is a perfectly effective and smoothly-working machine, free from liability to accident. It is sought to reduce it to the smallest number of unexposed parts, and so to simplify them that they can be easily repaired or duplicated and be interchangeable. In the upper portion of the section, midway between the centre and ends of the cylinder, are two annular grooves; these are connected on the back by a passage way, forming a steam chest, to which the supply pipe is attached. The exhaust port is located in the center of the cylinder. In the piston head are two grooves, which also pass entirely around, corresponding in width to those in the cylinder, distant from each other half the space of the latter from the exhaust port. In the right-hand portion of the piston, extending from the grooves in the same to either end, is shown a passage way for steam. In the lower part of the cut is what is termed the cushion valve, its lower end resting upon the lower head of the valve chamber. The valve is cylindrical, and reduced in size, between the ends and middle, to admit of free passages of steam to the exhaust ports of its chamber.

From this description, the operation of the drill can be easily understood. The steam forms a cushion at the end of each stroke, which prevents the piston from knocking. To the upper head of the cylinder is secured the usual device for rotating the piston and drill, consisting of a rod with spiral flutes, entering a socket in the piston head.

The improvements embodied in this drill secure a large percentage of useful effect, with the least supply of steam, the utmost expansive power of the same being utilised by its peculiar construction; and since no part strikes another to give it motion, the wear is insignificant. The inventor has displayed great skill in locating the control of the piston's action within itself, thus rendering the free and perfect operation of the drill wholly independent of auxiliary appliances. The drill may be operated equally well by the use of compressed air, and is absoluteiy non-freezing. In our opinion the claim of the manufacturer that this drill presents the greatest simplicity and efficiency is well founded, and wherever it is introduced it will give satisfaction.

Registration of New Companies.

The following joint stock companies have been duly registered:—

THE PARISIAN COMPANY (Limited).—Capital 20,000*l.*, in shares of 5*l.* To print, publish, and sell in Paris and elsewhere newspapers, books, periodicals, &c. The subscribers (who take one share each) are—A. H. Johnson, Paris; C. S. Wason, Paris; T. E. Child, Paris; L. Chappiot, Paris; C. H. Blackett, Paris; H. A. Johnson, 31, Fountayn-road; H. D. Badcock, Highgate.

THE WARMLEY COLLIERIES COMPANY (Limited).—Capital 20,000*l.*, in shares of 20*l.* To acquire by purchase or otherwise the lands, mines, minerals, collieries, and coal works, together with all engines, machinery, plant, and other works, premises, &c., situate in the parishes of Bitton and Liston, Gloucestershire, or elsewhere, and all interests or rights therein necessary to work, develope, and carry on the same, and in all branches the businesses of colliery proprietors, miners, smelters, coal and iron masters, merchants, and brick and tile manufacturers. The subscribers (who take one share each) are—E. W Jones, Weston-super-Mare, gentleman; E. L. Owen, jun., Bristol, mining engineer; W. J. Nicholas, Bristol, solicitor; A. Pilsworth, Clifton, gentleman; J. J. Bissicks, Bristol, merchant; H. Fern, Bristol, journalist; E. L. Owen, Bristol, mining engineer. The subscribers will name the directors, the qualification being fixed at ten shares.

THE MIDLAND FRUIT AND MARKET GARDEN PRODUCE COMPANY (Limited).—Capital 25,000*l.*, in shares of 5*l.* To carry on the business, wholesale and retail, of a fruiterer, market gardener, seedsman, and florist in all its branches. The subscribers (who take one share each) are—T. A. Adams, Pershore; F. Ministow, Worcester; T. Smith, Grisseley; J. Moore, Worcester; W. Harnett, Kempsey; M. Spiers, Pershore; T. H. Ballard, Worcester.

THE ST. DONAT'S STEAMSHIP COMPANY (Limited).—Capital 24,000*l.*, in shares of 125*l.* To carry on the business of a steamship owner in all its branches. The subscribers are—C. N. Harrison, Cardiff, 5; J. Moore, Cardiff, 5; J. E. Griffiths, Cardiff, 1; T. W. Jones, Cardiff, 2; J. W. Thomas, Cardiff, 2; D. A. Thomas, Aberdare, 4; O. H. Riches, Cardiff, 2.

THE SUBURBAN PROPERTY COMPANY (Limited).—Capital 5000*l.*, in shares of 10*l.* To buy and sell houses and land of whatever tenure in the United Kingdom. The subscribers are—E. Hughes, Woolwich, 105; H. Wright, Old Plumstead, 10; H. O. Thomas, Woolwich, 10; T. Gamble, 5, Harrington-road, 10; W. G. Thomas Plumstead, 20; W. T. Vincent, Plumstead, 10; P. Hughes, Plumstead, 20; F. Smith, Plumstead, 15.

THE CONTINENTAL A B C RAILWAY GUIDES AND GENERAL PUBLISHING COMPANY (Limited).—Capital 20,000*l.*, in shares of 5*l.* and 1*l.* To print, edit, and sell for the use of travellers, railway, steamboat, and diligence guides. The subscribers (who take one share each) are—A. Halcomb, Richmond; F. J. Worrocks, 17, Philpot-lane; E. J. Charter, 21, Hogarth-road; H. Fleet, South Hackney; C. W. Kirk, 148, St. Paul's-road; G. Mann, 16, Philpot-lane; R. Neil, Brighton.

THE HUNGARIAN STATE GOLD MINING COMPANY (Limited).—Capital 100,000*l.*, in shares of 1*l.* To purchase, lease, or otherwise acquire and work the Hungarian State gold mines, called Vörospatak, and other mines, minerals, and mining rights situate in Transylvania or elsewhere. To crush, wash, smelt, reduce, and amalgamate gold, silver, and other ore; sell or otherwise dispose of the produce, and develope the resources of the said or any other mines that may come into the possession of the company, and power is also reserved for erecting all necessary buildings, machinery, apparatus, &c. The subscribers (who take one share each) are—T. Hollis, Stoke Newington, gentleman; S. Cocker, 93, Tulse-hill, merchant; J. J. Robinson, Finsbury Park, gentleman; J. Stephenson, 26, Suffolk-street, merchant; C. F. Griffin, Shepherd's Bush, gentleman; H. Wilde, Bushy Heath, barrister; H. A. Fernley, 28, Seething-lane, writer. The number of directors must not exceed five or be less than three. The following are the first directors—Messrs. Cocker, Wilde, T. E. Foakes, and W. Martineau. Other directors will have to qualify in 100 shares each.

MOSER'S PATENT DRY CLOSET AND POUDRETTE COMPANY (Limited).—Capital 50,000*l.*, in shares of 5*l.* To manufacture and sell articles and apparatus in connection with certain patents secured by the company. The subscribers (who take one share each) are—H. C. Bartlett, 29, Duke-street; T. Gibbs, Dunster House, Mark Lane; L. Moser, Southampton; W. T. Jennings, Wandsworth Common; E. H. Pepys, Woodford; S. Burstall, Oriental Club; H. R. Snelgrove, 7, Craven-street.

SUBURBAN AND LAND AND COTTAGE COMPANY (Limited)—Capital 100,000*l.*, in shares of 1*l.* To carry on the business of a land and building company. The subscribers (who take one share each) are—J. R. Ripley, Streatham Common; S. J. Hobson, 10, Regent's Park-road; E. M. Goodwin, 4, Earl's Court Gardens; T. H. Browning, Addiscombe; W. Battye, 16, Great Winchester-street; F. A. Bagnall, 2, Arbour-street; A. Tapewell, 33, Mildmay Grove.

TREATMENT OF AURIFEROUS SULPHURETS.

THE NEW MEARS-PLATTNER CHLORINATION PROCESS.

It has frequently been noted that the great obstacle to the successful development of the auriferous deposits of Wales has been the difficulty of separating the precious metal from the sulphides with which it occurs, although it is beyond question that in the United States ores quite as difficult of treatment have been satisfactorily manipulated. Another new chlorination process, said to be the result of years of study and experiment on gold bearing ores, especially on those classed as refractory sulphides, is now being introduced by Mr. J. Howell Mears, M.D., and is described in the San Francisco Mining and Scientific Press. It appears that ores of the sulphide class have been reduced by this process for some two years with such success that the resulting tailings contain nothing of appreciable value, and the yield of bullion is frequently equal to the value of the ore as determined by fire assay. It is pronounced to be an improvement on the older and approved processes of chlorination, including the Plattner, for it not only gives the best result in one-tenth of the time required by the latter process, but it does so at a small cost. Dr. Mears maintains that the advantages of his improved process have a wide application, and that it will largely supersede amalgamation in gold quartz mining. It obviates the large loss of fine or float gold, which is inseparable from amalgamation, and it has over come the chief obstacles to the use of previous processes of chlorination by lessening the expense and reducing the time to the minimum. That these obstacles have been overcome by the process of Dr. Mears has been demonstrated on a working scale in several mills. These repeated demonstrations have perfected the detail and determined the practice of the Mears process, and now that invention may be said to give assurance of a new departure in the methods of obtainiug the gold from refractory sulphides. The Plattner process is too well known to require mention. The "Mears-Plattner process" derives its specific character from compressed chlorine in a revolving cylinder containing the gold-bearing roast-mass. The advantages claimed for this improvement are—1. Expedited action, by which time is greatly reduced.—2. Contraction of the operating area and appliances, giving economy in material, in handling, and in outlay for plant.—3. A close, indeed a closer, extraction of the metal than is obtained by the older process according to Plattner.

The description can be very concisely given. Chlorine is generated in the usual manner by sulphuric acid, peroxide of manganese, and common salt, or, if preferable, by hydrochloric acid and manganese The generator of ordinary construction, and of a size proportioned to the work proposed. A gas-holder, or gasometer of metal, properly protected and of moderate size, is used, as like tanks for illuminating gas, and for a like purpose, as a magazine to hold a constant supply. Connection pipes of lead intermediately connecting a specially-devised force pump with the gasometer and a strong reservoir, into which the force pump compresses chlorine to the required degree of pressure, thereby also obviating the necessity for a large gasometer. Connecting pipes, adjustable to a cylinder of iron lined with lead, the cylinder revolving on trunions centered on the heads, and resting in boxes firmly seated on the iron frame support, one trunion being hollow, to which the connecting pipe is adjusted. Central on the periphery of the cylinder a manhole fitted with an adjustable cover. All assailable parts protected with sheet lead, and the parts firmly bolted together, and capable to resist a pressure much greater than the working maximum, and indicated by an attached pressure gauge. Filtering vessels with prepared bottoms, transportable on wheels, into which the chlorinated charge is dumped from the cylinder. water added, and from which the liquid or solution containing auric chloride is filtered or leached out until a test shows no trace of gold. Vessels or receivers for the solution and for precipitating according to the method practised.

The complete plant being established, a charge consisting of 2000 lbs. dead-roast is put into the cylinder, and to this 125 gallons of water added. The thorough mixing is then effected by revolving the cylinder. After having exhausted the atmosphere, to prevent adulteration of the chlorine, the charge of chlorine from the pressure reservoir is admitted until the gauge indicates the required density. The chlorine is then shut off, and the cylinder kept revolving from 30 to 60 minutes. The chlorine having by this time thoroughly dissolved the gold in the dead-roast, the excess of gas under pressure is allowed to pass off either into the gasometer for re-use or into a newly-charged cylinder to chloridise another ton of dead-roast. The gas remaining in the water held by absorption is expelled or drawn off by means of a vacuum produced by adjusting the connections with the pump. The chlorination being finished, and surplus gas discharged, the whole contents are run into leaching vats. The leaching is finished when the liquid no longer shows a trace of auric solution in the sample tested. This solution is then ready for the precipitating agent. If the sulphate of iron, it is added until a test sample shows no discoloration on adding a few drops of the sulphate. If charcoal, this auric solution is run through barrels properly filled with carbon, two or more being used for absolute security that the whole of the gold has been deposited. In the first case the precipitate is washed, some sulphuric acid being used to clear it of contaminating matters, and then smelted into an ingot with borax, &c. Or, in case carbon is used, the rich gold concentrate is dried and incinerated, the ashes washed out, and the gold smelted as in the previous case.

By following these simple, progressive, and systematic operations the entire contents of the auriferous dead-roast are extracted and put in the form of bullion; and if the operations have been conducted with the care that the process demands and makes easy there will scarcely be a trace of gold left in the concentrate, certainly not over 50 cents a ton. In an establishment where several tons of dead-roast are worked continuously only, or mainly, that chlorine absorbed by the water is wasted. The first consideration in the process of chlorination is a perfect roasting of the mineralised ore. The furnace formerly preferred was a modified construction of the reverberatory in terrace or double hearths. Mechanical furnaces have been used with more or less satisfaction. At present the Mears Company use a revolving hearth. In regard to this highly important matter of roasting, it may be said that any furnace which performs the work well may be collected for the purpose. Between the Plattner and the Mears-Plattner processes there is no difference in the cost of chemicals or other materials, or wages, the advantages of the Mears process consisting in the expedition of the operation, the conservation of chlorine, and the close extraction of the gold.

DIRECT ACTING PUMPING-ENGINES.

For the construction and working of direct acting pumping-engines with the objects of reducing the prime cost of the machine, providing a simple means of working direct-acting engines expansively, reducing the working cost of direct acting high pressure engines by the expansion of the motive power, obtaining a more compact arrangement than has hitherto been arrived at, and making it optional whether one or more pressure cylinders are used, Mr. H. FABIAN, of Erith, prefers to arrange the barrel or barrels of the pump or pumps in line with the main cylinder or on either side thereof, in which latter case he connects the plunger-rods of the pump-barrels to the piston-rod of the main cylinder by a cross-head.

The valve or valves which control the admission of the steam, compressed air, or other suitable motive agent to the main cylinder is or are arranged in a suitable chest, and is or are operated by means of pistons and rods which lead therefrom, the pistons being located in small cylinders, one of which is in communication with the interior of the main cylinder, the other being in communication with the interior of the pump-barrel, the cylinders being respectively exposed to the pressure and exhaust within the main cylinder, and to the pressure and suction within the pump-barrel.

Each end of the main cylinder is in communication with the opposite end of its subsidiary cylinder, and each end of the pump-barrel is in communication with the corresponding end of its subsidiary cylinder by means of suitable ports and pipes or passages, but the communications between the main cylinder and the pump-barrel, and their respective subsidiary cylinders, may be arranged otherwise than or opposite to that just stated. Upon the piston of the main cylinder starting upon its stroke towards the pump-barrel, being in line therewith, it, at any predetermined point, uncovers the port leading to the end of its subsidiary cylinder adjacent to the pump-barrel, and thus admits the steam or other motive agent to this end thereof, causing the piston therein to shift the valve so as to cut off the further supply of the motive agent to the present pressure end of the cylinder, and cause the piston to complete its stroke through the expansion of the contained motive agent, the other ends of both cylinders being open to the exhaust and permitting of these movements. Upon the plunger of the pump-barrel passing the port at the end from which it started, and leading to the corresponding end of its subsidiary cylinder, the latter is open to the suction end of the pump-barrel, and pressure is exerted through the corresponding port at the other end of the barrel and leading to the same end of its subsidiary cylinder, and thus operates upon its piston, causing the shifting of the valve to be completed (there being a sufficient clearance allowed in the piston details of its subsidiary cylinder), so as to open the exhaust to the end of the main cylinder furthest from the pump-barrel, and admit the motive agent to the end nearest the latter, and thus cause the return stroke of the main piston and pump-plunger, and which is similarly effected.

SUBMERGED PUMP.—A new form of submerged pump has been invented by Mr. HOWE, of Belmont, New York, which consists of three cylinders, set together in a single casting and placed at the bottom of the well. These cylinders are held in position by the rising pipe. A three-throw crank at the top gives motion to the piston by means of small rods. As the pistons only act upon the up-stroke, these rods are constantly in tension, and consequently can be made very light. Indeed, the connections might be made of rope, so far as the action of the pump is concerned. The advantage of the three cylinders is very marked in a deep well, where the rods in an ordinary pump begin to be a material increase of the lode to be raised. As the rods are all balanced, power is needed only for raising the water in the pipe.

HOLLOWAY'S PILLS—WEARY OF LIFE.—Derangement of the liver is one of the most efficient causes of dangerous diseases, and the most prolific source of those melancholy forebodings which are worse than death itself. A few doses of these noted pills act magically in dispelling low spirits, and repelling the covert attacks made on the nerves by excessive heat, impure atmospheres, over-indulgence, or exhausting excitement. The most shattered constitution may derive benefit from Holloway's pills, which will regulate disordered action, brace the nerves, increase the energy of the intellectual faculties, and revive the failing memory. By attentively studying the instructions for taking these pills and explicitly putting them in practice, the most desponding will soon feel confident of a perfect recovery.

Lectures on Practical Mining in Germany.

CLAUSTHAL MINING SCHOOL NOTES—No. CLXII.*

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ON VENTILATION.

At the Shamrock Colliery, near Bochum, in Westphalia, the grate bars of the furnace are formed of hollow 3-in. cast-iron pipes, which are provided at each end with a ½-in. collar. The collars drop into grooves on the bearing plates at each end, thus keeping the bars at the proper distance apart. The bars are rotated about 90° every 20 to 30 minutes by means of keys, which fit into the front end of the bars. On this account the bars can be kept much cooler, and burn away more regularly, which contributes to the durability of the grate bars. The furnace is 7 ft. broad and 9 ft. long, and a ventilation of 50,000 cubic feet per minute is obtained with it.

In order to obtain a comparison of the useful effect of furnace ventilation it is usual to ascertain the horse power theoretically required for the ventilation, and also the horse power of the furnace as given by the quantity of coal consumed per hour. The theoretical horse power expended in effective ventilation is found by multiplying the amount of ventilation in cubic feet per minute, by the drag on the water guage, expressed in inches, and by 5·19,† and dividing the product by 33,000. For example, suppose the case of a furnace passing 50,000 cubic feet per minute, with a drag of ¾ inch on the water guage. The effective horse power equals $50{,}000 + \frac{3}{4} + 5{\cdot}19 \div 33{,}000$, or 5·9 horse power. The horse power developed from the combustion of 1 lb. of coal per hour under the boiler of a steam-engine, with steam of three to five atmospheres pressure, varies in the case of non-condensing expansive engines from ·12 to ·25 horse-power, and in the case of condensing engines from ·16 to ·47 horse-power per hour.

According to numerous experiments it has been found that 1 lb. of coal consumed under a boiler will convert 8½ lb. of water into steam. The specific heat of air is ·267, or the same amount of heat which would raise 1 lb. of water 1° in temperature, would raise 1 lb. of air (about 13 cubic feet) 3¾°, or 50 cubic feet 1°. The theoritical heating power of 1 lb. of coal is equal to the evaporation of 13·75 lbs. of water, or the heating of 650,000 cubic feet of air 1°. From the above it will be noticed that when applied to the heating of water in a boiler the ratio of the actual heating effect to the theoretical is as 8·5 to 13·75. When applied to the heating of air in a ventilating furnace the actual effect is sometimes much nearer the thereotical, being about 500,000 cubic feet of air raised 1° in temperature. At the Hetton Colliery a 9 ft. furnace gave 16,320 cubic feet of air raised 29° in temperature for each pound of coal, or 473,280 cubic feet raised 1° in temperature. At No. 3 Pit of the Grand-Buirson Colliery, Belgium, 1 lb. of coal gave an effect of 14,460 cubic feet raised 25° in temperature, or 361,500 cubic feet raised 1° in temperature. At No. 2 Pit, in the same colliery, 1 lb. of coal gave an effect of 11,810 cubic feet raised 43° in temperature, or 510,000 cubic feet 1° in temperature. As may be expected the effect will vary greatly, according to the quality of the coal used, the construction of the furnace, and the lining of the shaft. The loss is very small in the case of well constructed furnaces, and properly lined and dry shafts, and may reach much as 75 per cent. in the case of badly contrived furnaces and wet shafts. The loss in temperature often reaches 1° for every 10 ft. in ascent. At the Haswell Colliery the observation was made that after the shaft had been diminished in section by the insertion of a lining of firebrick the useful effect and the amount of ventilation were increased. The insertion of a lining of firebrick is thus advantageous in diminishing the loss of heat, and therefore of ventilating power, besides protecting the cast-iron tubbing now inserted in so many shafts.

The greatest effect obtained in England with furnace ventilation seems to vary from 200,000 to 250,000 cubic feet per minute, and the greatest velocity of the air current 30 ft. per second. This velocity refers to the current near the upcast shaft, and not to the general velocity of the air through the mine. As an example of a high velocity in one of the marn splits of a mine may be cited a split of 75,000 cubic feet per minute at Wallsend Colliery, with a velocity of 27 ft. per second. The usual velocity of the main roads of a colliery varies from 8 ft. to 15 ft., whilst that at the working face is only from 2 ft. to 5 ft. per second. A greater velocity gives a sensation to the miners of working in a draught. An increase in the amount of ventilation by the use of such high velocities is an extremely expensive method; for if the velocity be doubled to obtain a double amount of ventilation, the resistances are increased fourfold, and the power required to increase the ventilation increases as the cube of the velocity; or in the above case the double velocity meets with a four-fold resistance, or for double the amount of air an eight-fold power is required. Similarly to obtain three times the amount of ventilation, if the velocity be increased threefold, the frictional resistances are increased ninefold, so that for three times the amount of ventilation the power required is increased 27 times. Moreover, if the power is obtained from a furnace the heat must be raised considerably, and the higher the temperature so much the greater will be the loss of heat (from the escape of the current at the surface at a comparatively high temperature), and the loss by radiation and conduction on the sides of the furnace and the shaft. On this account the increase of power actually required in practise must be looked upon as being as the fourth power rather than as the cube. The greatest mean heat of the upcast shaft seems to be from 150° Fahr. to 180° Fahr., and it will generally be found that where this is the case the useful effect of the fuel burnt is comparitively small. When such great heats are employed the shaft cannot well be used for winding or pumping, even though iron conductors are employed. The best average appears to be about 86° Fahr., if the shaft is used for winding. A limit is soon reached in the employment of high temperatures, on account of the comparitively small exhaustion (seldom exceeding 2½ in. of the water guage), which can be obtained with a furnace. The average effect of a furnace of 50 square feet area, in moderate sized collieries may be put down at 50,000 cubic feet per minute, or 1000 cubic feet per square foot area per minute, with a consumption of 2 tons per 24 hours. In small collieries the furnace ventilation may only amount to from 15,000 to 20,000 cubic feet per minute. The above average furnace effect gives 11·14 cubic feet of air per minute passed through the mine per pound of coal burnt in the 24 hours. The result of observation on the ventilating furnaces of 10 English collieries consuming on the average 3 tons of coal per 24 hours, gave for every 1 lb. of coal burnt in 24 hours a minimum of 7·07 cubic feet passed through the mine per minute; a maximum of 13·5 cubic feet per minute, and an average of 8·5 cubic feet per minute. In Phillip's Reports on the Ventilation of Mines and Colleries, 1850, the following figures respecting the consumption of coal per 24 hours, and the amount of ventilation per minute are given. At Haswell Colliery the amount of the ventilation is given as 100,917 cubic feet per minute, and the consumption of coal 4 tons per 24 hours. At Hetton Colliery the amount of the ventilation is given as 190,000 cubic feet per minute, and the consumption of coal 9 tons per 24 hours. At Morton and South Hetton Collieries 132,895 cubic feet per minute, and 8½ tons of coal consumed per 24 hours, or per 1 lb. of coal consumed in 24 hours 11·2, 9·4, and 7·2 cubic feet per minute respectively.

Details are given by Ponson respecting the effect of the furnaces at the Pits Nos. 5 and 10, Grand Hornu Collieries, and the Vidette and Ernest Pits of the Anzin Collieries respectively. The mean of the observations give 9600 cubic feet of air per minute, and a consumption of 1146 lb. of coal for 24 hours; or 0·8 lb. per minute, or 48 lb. per hour, or 8·3 cubic feet per minute for every 1 lb. of coal burnt per 24 hours, which approximates very nearly with the average of observations on English collieries. Von Rohr gives the following results of observations on colliery furnaces, chiefly in Lancashire. At Houghton-le-Spring 120,000 cubic feet per minute, area of firegrate 144 square feet, coal consumed for 24 hours 70 cwts., or ½ cwt. per square foot of grate surface. At Pendlebury Colliery 70,000 cubic feet per minute, area of firegrate 80 square feet, coal consumed for 24 hours 120 cwts., or 1½ cwt. per square foot of grate surface; and at Kirklees Hall 80,000 cubic feet feet per minute, 36 square feet area of grate surface, coal consumed per 24 hours 45 cwts., or 1¼ cwt. per square foot of firegrate.

The above method of finding the amount of ventilation per minute for every 1 lb. of coal consumed per 24 hours is, perhaps, the most convenient for comparing the efficiency of furnace and mechanical ventilation. The following examples, coppied from Orr's "Useful Metals, and their Alloys," gives a comparison of the useful effect in in horse-power of furnace ventilation. At the Tyne Main Colliery 34,955 cubic feet per minute were exhausted at a drag measured by 0·2 in. of water, under natural ventilation, caused by a difference in temperature of 20° between the two shafts. The horse-power expended in effective ventilation was, therefore, $34{,}955 \times 0{\cdot}2 \times 5{\cdot}19 \div 33{,}000$, or 1·1 horse-power. By the consumption of 16·76 lbs. of coal per minute, which increased the difference of temperature to 94°, the useful work became 101,876 cubic feet × ·915 inches × 5·19 and ÷ 32,000, or 14·66 horse-power; this is the power of a shaft 208 yards deep and 50 square feet in area. At the Hetton Colliery the upcast shaft is 153 square feet in area and 300 yards deep. A difference of temperature of 28° in natural ventilation produced 127,145 cubic feet × ·055 inches drag × 5·19 and ÷ 33,000, or 11 horse-power; and a difference of temperature of 86°, the result of the consumption of 18·86 lbs. of coal per minute, yielded 208,466 cubic feet × 1·2 inches drag × 5·19 and ÷ 33,000, or 39·34 horse-power.

The Tyne Main and Hetton shafts yielded 0·81 and 1·5 horse power by the consumptian of 1 lb. of coal per minute, a difference owing to the higher temperature, the unequal area, and the metal tubbing in the former shafts. We have previously mentioned that the horse-power developed from the combustion of 1 lb. of coal per hour under the boiler of a steam-engine, with steam at three to five atmospheres pressure, varies in the case of non-condensing expansive engines from ·12 to ·25 horse power per minute, or 7·2 to 15 horse power per hour per pound of coal consumed per minute; and for condensing expansion steam-engines from ·16 to ·47 horse power per hour for the consumption of 1 lb. of coal per hour, or 9·6 to 28 horse per hour per 1 lb. of coal consumed per minute. Comparing these figures with those deduced for the Tyne Main and Hetton furnaces, it will be at once evident that but a small portion of the actual available power of the fuel is effective in the case of furnace ventilation, and that there remains a great margin for the economical use of steam-power in mechanical ventilation. The principal but inseparable loss of power by furnace ventilation is due to the fact that the current from the upcast shaft leaves it at a high temperature.

* Being Notes on a Course of Lectures on Mining, delivered by Herr Bergrath Dr. VON GRODDECK, Director of the Royal Bergakademie, Clausthal, The Harz North Germany.

† 5·19 lbs. = weight of 1 square foo of water 1 inch deep.

THE IRON AND STEEL INSTITUTE—No. II.

THE IRON INDUSTRY OF GERMANY.

Dr. Hermann Wedding, of the Ministry of Public Works, Berlin, read an interesting and exhaustive treatise on this subject. After briefly referring to the early history of the trade, Dr. Wedding pointed out how rapid has been the progress made by Germany in recent years. Although some movement was made towards the close of the last century, consequent on the introduction of the steam-engine, it was only about 25 years ago that the use of coal in iron smelting and working became at all common, the development of railways having materially facilitated its transport. Since 1867 the high-blast furnace, with increased blast, and the adoption of the Bessemer process in the manufacture of ingot iron, have worked a complete revolution, and Germany holds at present the third place in the foremost rank of iron-producing countries. The most rapid growth was between 1870 and 1873, in which period the production nearly doubled, and although the trade in Germany, in common with all other industries, suffered severely in the succeeding five years of extreme depression, the decrease in the production was only about one-sixth, and this has nearly been recovered. The principal and most remarkable development has been in the manufacture of ingot iron by means of the converter and open-hearth furnace in contradistinction to the manufacture of forge-iron by puddling and shingling. The principal coal basins are Upper and Lower Silesia, Zwickau, Rhineland, Westphalia, and Aix-la-Chapelle. These coals are for the most part unsuitable for the manufacture of iron, containing too large a quantity of gas, and, consequently, have to be mixed with other sorts. Of iron ores Germany has immensely wide and abundant deposits; but here again the quality is for the most part inferior to that of English stone, being generally characterised by a large percentage of phosphorus. The most common form is a brown earthy ore.

Germany is, however, rich in spathic ores, which provide an excellent material for the production of speigeleisen, so largely used in steel-making. In the face of the fact, therefore, that the common ores of Germany are most suitable for the production of white pig for puddling the very rapid growth of the manufacture of ingot iron is remarkable. Large quantities of ore from South Europe and Africa are necessarily imported, and although, of course, the manufacture of puddled iron is by far the largest factor of the total production, the rate of the growth of the output of ingot iron bids fair in the not very distant future to take the lead. The greatest drawback, however, with which German ironmasters have to contend is that in the great majority of instances the distances between the iron and coal beds are very considerable, and it is only in rare cases that the local production of ore suffices for the requirements of the local iron industry. This disadvantage is aggravated by the difficulty of transport. All the iron districts are in the interior of the country, and are practically shut off from water carriage; and railway carriage is, of course, expensive. This is made the plea for protective duties by the German ironmasters, and last year, it may be remembered, the duty on imported pig-iron was nearly doubled. That this has not had the effect of seriously interfering with the export from Cleveland may be accounted for by the fact that wealth is spreading in Germany, and that, as is well known, one of the first requirements of wealth is iron. In fact, Germany is now pretty much where England was a decade ago in the proportion of iron used per head of population. The paper was read by Dr. Wedder in excellent English, and was graphically illustrated by reference to a series of maps describing the production, consumption, and distribution of iron in Germany.

DEPHOSPHORISING IRON IN THE BESSEMER CONVERTER.

M. J. Messenez, of Hoerde, Westphalia, next read an interesting paper on the dephosphorisatian of iron carried on in the Bessemer converter with basic linings. For many years it was generally believed that the dephosphorising of pig-iron could only be accomplished in the open hearth; but the investigations of Messrs. Snelus, Richards, Thomas, and Gilchrist, in quite recent years, have made it clear that dephosphorisation can be accomplished by means of the basic process in the Bessemer converter. It would be difficult to over-estimate the importance, not only to the iron trade in particular but to the public generally, of these experiments and investigations. The meaning of the process is this. By far the largest and most easily worked deposits of iron ore in all parts of the world, so far as we know them, are more or less charged with phosphorus; and it would almost seem as the more abundant the ore the greater the percentage of phosphorus, The effect of a high percentage of phosphorus in pig-iron is to render it unsuitable for conversion into ingot iron, or steel as it is most commonly called in England. Such iron is generally know as white or mottled pig, and when made into wrought-iron lacks toughness and ductility. In consequence, the pure iron ores of West Yorkshire—especially those of Low Moor and Bowling—and the hematite ores of Cumberland produce an iron or steel which commands a very high price in the market, owing to its extreme toughness and ductility. If by any means the phosphorus can be eliminated from the pig in the Bessemer converter, then a vast field will be opened to the cheapest and most abundant ores from which they are now excluded. That this can be done expeditiously, with certainty, and at small expense, is being practically demonstrated in several works in the Dusseldorf district where the Thomas-Gilchrist process is in active operation, and Messrs. Bolckow, Vaughan, and Co. are now expending about 100,000*l.* in plant for the purpose at their works at Middlesborough. The secret consists in the use of Bessemer converters double the capacity of those hitherto used, and lined with bricks of basic material—that is, strong in magnesian limestone; so that in the process of blowing the phosphorus is chemically liberated and consumed. The paper of Mr. Massenez gave in detail the results accomplished at the Hoerde works, and explained the means by which these results had been attained. At the request of the President the discussion on this paper was adjourned until the following day, as in the meantime the members would have an opportunity of inspecting the process in operation.

The discussion upon this paper was opened by Prof. von Tunner who referred to his recent report on the basic process. He considered the chemical process already proved, but the commercial question was a very difficult one to grapple with, seeing that the process was comparatively a new one. The information given at the works where this process was in operation was not always complete, owing to the fact probably that the conditions were so variable. There could be no doubt, in his opinion, that the process was destined to come into extensive use for the production of soft metal, because the final temperature in carrying out the basis process was greater than the final temperature in the ordinary Bessemer process. It was difficult as yet to produce hard steel by the basic process. It would seem, also, that the additional carbon could easily be obtained by adding more espiegel at the end, but the *modus operandi* had been limited up to the present time. Not only were foreign matters introduced into the espiegel, but the quality of the steel seemed to suffer more than in proportion to the impurities accounted for in the espiegel. It was, therefore, no wonder that the old process was still carried on side by side with the new, and that in the higher qualities of steel the former was resorted to, but the most important question was that of cost, for by that test every process must be judged. He would not say that the advantage in favour of the new was as much as 20s. per ton, though there could be no doubt that an important advantage might be claimed for the new process. The great difficulty was how to eliminate the sulphur. At present they depended on the blast-furnaces for this elimination. Poor ironstone, as they all knew, contained a great deal of silica, and it was very difficult to obtain a basic slag, upon which the elimination of sulphur depended. Although a s one representing Austria, it might be supposed that he would not wish success to the new process, yet in the interest of science he sincerely trusted the process might prove successful.

Mr. Samuelson enquired by what means it was hoped that sulphur would be eliminated.——Prof. von Tunner considered that the separation of the sulphur in the converter could not be accomplished without great cost, and, therefore, must be obtained by the blast-furnace. In the very last stage sulphur was left in the converter, and in order to effect elimination manganese ought to be present and the overflow be continued, if only on commercial grounds.

Dr. Wedding gave the result of a series of experiments instituted at the instance of the German Government, but which were not completed. He was strongly of opinion that there was no difficulty in the way of the new process that could not easily be surmounted.

Mr. I. L. Bell felt strongly that the time had arrived when sufficient attention had been paid to the chemical aspect of the question. He remembered very well the howl of indignation and contempt with which Mr. Bessemer's announcement, in a paper read at the meeting of the British Association in 1857 at Cheltenham, that he could make wrought-iron out of pig-iron without any further addition of fuel and without any loss of heat in the process, was received by the iron-masters of the day. The change brought about since that day was very remarkable. He was proud to say that it was in some measure due to the Iron and Steel Institute, and it had done a good work if it had only been the means of bringing so many eminent scientific foreigners together. He only wished that English scientists could afford as much instruction as they had derived from scientific gentlemen on this side of the water. Really the question of dephosphorisation was now so transparently clear that they had now only to face the commercial part of the problem. Prof. von Tunner estimated that the extra cost of the basic process, as carried out in Germany, was about 20s. per ton. That amount, it must be admitted, was far beyond the ultimate expectations of its introducers. But he remembered, a few years ago, when pig-iron from the West Coast, suitable for steel making, was sold at 50s. a ton, that gentlemen in the trade were quite prepared to assert that unless they could get at least 12*l.* a ton for rails they would have no reasonable profit, and if any one had propounded that it would be possible to build and equip steamers to cross the Bay of Biscay, load ores at an inaccessible Spanish port and unload in the Tees, cargoes from which steel rails of unexceptionable quality could be manufactured more cheaply than iron could be made from Cleveland pig, the proposition would have been received with incredulity. It was very difficult to predict what economies might be effected in working a new process like this, but, admitting for the purpose of argument that the extra cost was 20s., it meant that unless they could get an iron suitable for the basic process for at least 20s. per ton less than they were paying for Bessemer pig, the process would be very short-lived. This opened up a very large question. As we grow older that which we now know as iron would gradually disappear, and would be transplanted by steel. Now, nature had not provided a sufficient quantity of ore to supply indefinitely the world's demand for steel, and so in course of time there must necessarily be a considerable increase in its value. It was a matter, therefore, of the utmost importance there, in Germany, where there were large quantities of phosphoric ores, that the process should be worked out, and he was not surprised that the process had excited more interest among their German friends than among Englishmen. He could not doubt that whether the difference were 10s. or 20s. per ton the new process must necessarily exercise a very important influence on the iron trade of the world.

Mr. Massenez, in reply to an objection from Dr. Siemens, stated that all the iron made at Ilseder was of that description, and was perfectly adapted for the basic process. At Hoerde they made a white pig with no more than the silicon. As regarded the economies that might be effected, it was very difficult to estimate them, because as yet no new plant had been set to work upon the new process, and the old plant was necessarily worked at a disadvantage.

Mr. Windsor Richards said it was very gratifying to him to find that all the statements made with regard to the practicability of the new process were fully borne out in practice there. The only remaining difficulties were the mechanical and the commercial. The first would, he believed, very soon be overcome; and as to the second, it only remained to make large quantities continuously, and he was satisfied that the result would be satisfactory. He had hoped that he would have been able to lay before the members at this meeting the results of the working of the new 15 ton converters at Bolekow, Vaughan, and Co.'s works, but they were scarcely yet ready for work. He, however, promised that he would take the very earliest opportunity of making a communication to the members on the subject.

Mr. Thomas, one of the patentees of the basic process, entered into a long discussion of the question of cost on the basis of the calculations made by Prof. Tunner. He believed that the extra charges had been over-estimated, and that even under existing circumstances instead of 20s. per ton it should be set down as not more than 16s. 6d. per ton.

The President, in moving the usual vote of thanks to the author, replied to some of the remarks of Mr. Bell. He said that the report of Mr. Bessemer's paper was published he believed on a Wednesday. That was the first he had ever heard about it, and on the following Saturday he had rolled at Dowlais two bars made from pig taken direct from the blast-furnace. That did not look very much like opposition. He would admit, however, that they did this believing that they would prove the fallacy of the whole thing; but they only proved that Mr. Bessemer was right and they were entirely wrong. The Dowlais Company took out a licence at once, and never abandoned the process until they had thoroughly tried it and failed. Mushet had not then arisen to show them the way to success.

thought that they might look for great economies in the new process when it came to be generally used.

CONVERTING CAST-IRON INTO WROUGHT-IRON.

According to the invention of Mr. L. D. CHAPIN, of Chicago, cast or pig iron is treated as in a converter by blowing air through it so as to eliminate impurities, and is then either mixed with a larger quantity of less pure iron, so as to obtain good serviceable pig from the mixture, or it is treated or puddled in a rotating or oscillating furnace, so as to produce balls for the manufacture of wrought-iron. The converter may be separate from the puddling or balling furnace, both of which may be of any known construction, or, according to this invention, the same vessel and apparatus may be made to serve both purposes. A cylindrical vessel, like those used as rotary furnaces, lined with refractory material, preferably presenting internal ribs or irregularities, is mounted so that it can be made to revolve or rock on its horizontal axis. Along one side of the vessel, in the lining thereof, is formed an air channel having a number of tuyere holes opening from it into the interior of the furnace. At one end the vessel is formed with a collar enclosed within a stationary hollow ring, from which there opens a side port, which, in one position of the furnace, when the air channel is lowest, corresponds with the mouth of the channel, so that when an air-blast is sent into the hollow of the ring the air passes into and along the channel in the furnace lining, and issues therefrom by the tuyere holes, blowing through the molten metal lying in the furnace. When the furnace is turned partly round, the tuyere holes being thereby brought up towards the surface of the molten metal, the port leading into the channel is more or less closed, and thus the blast is moderated to suit the less depth of metal through which it has to pass; or when the furnace is turned still further round the blast port is closed altogether. The ends of the furnace vessel are open, but provided with doors, and the vessel is mounted between a furnace fire at its one end and a chimney or flue at its other end. The vessel also has a part of its side opposite to the air channel hinged, so that it can be opened as a door, and it has in this door a feeding hole, which can be closed by a plug.

With a furnace so arranged iron is thus treated, The vessel being turned to the position where its air-channel is lowest and its feeding hole highest, molten iron is run into it, and the blast is turned on and continued until the impurities are eliminated so far as may be desired, their elimination being promoted by giving the vessel more or less rocking motion, so as to direct the blast from the tuyere holes through all parts of the metal. When it is desired to produce good pig from impure iron a portion is first thus purified by the blast, and then a farther portion being run into the vessel and mixed therewith, the whole may be run out as good pig. When wrought-iron is to be produced the metal is first purified by the blast, and then the blast being stopped the end doors of the vessel are opened, so that the reverberatory flame passes through it, and the vessel being then caused to rotate or oscillate on its axis the metal becomes puddled and balled, and the ball or balls can be removed by opening the side door, and treated in the usual way for the manufacture of wrought-iron.

INDICATING THE WATER LEVEL IN STEAM BOILERS.—Instead of placing the float inside the boiler as usual, Mr. J. REIMANN, of Paris, encloses the float mechanism in a special and complete apparatus, which may be fixed to the exterior of the boiler or may be placed even at a considerable distance from the boiler, to which it is connected by two pipes (after the manner of water-gauge tubes), one for the steam and the other for the water. Care must be taken, however, that in all cases the height of the plane passing horizontally through the centre of the float chamber corresponds to the mean water line in the boiler. In applying the apparatus to an ordinary boiler, he encloses it in a metal box of circular or other convenient form, fitted with a cover which is readily removable for the purpose of enabling the interior and parts contained therein to be examined and repaired when necessary. This box is provided with three hollow extensions of circular form, one at the top, and another at the bottom, and a third at the side. Through the hollow extensions at top and bottom are passed pipes fitted with cocks which connect the upper and lower half of the box chamber with the steam and water respectively contained in the boiler. It will now be understood that when the apparatus is fixed in its proper position, and the cocks are turned on, the interior of the box will become filled half with water and half with steam. The interior of the box is fitted with a float of hollow copper, or any other approved construction, attached to the end of an arm, keyed or pinned fast on a spindle, which rocks in socket bearings screwed into the third hollow extension, before mentioned, in the side of the box. This spindle projects through the socket (which is screwed into the casting of the hollow extension) to the exterior, when it is fitted with a hand or indicator, which extends about half way across the removable cover of the box to a dial or quadrant marked on the face of the cover. A small spring serves to keep the interior shoulder of the spindle tightly pressed against the bearing in which it turns and prevents the escape of steam or water. Thus, every movement of the floating ball within the box will be indicated on its cover by the hand moving over the dial, which may be marked from zero at its centre, when the hand will be exactly horizontal to 6° or more above and below the horizontal position. By very simple lever mechanism the rise or fall of the float may be made to actuate a steam whistle or other alarm signal, and thus call attention to the lack or excess of water in the boiler.

PULVERISING MINERALS.—The machine for finely pulverising tin, copper, lead, and other metallic minerals and the ores thereof, and also the slimes and leavings either before or after they have been subjected to any other crushing, roasting, or separating process, invented by Messrs. MICHELL and TREGONING, of Camborne, consists of a hopper or receiving vessel for all substances passing through the crushing part of the machine. An inlet pipe conducted through a hollow bearing connects the hopper with a cylinder or barrel by a watertight flange; through this inlet pipe the substance to be crushed is conducted from the hopper into the cylinder which is to contain the substance to be crushed which has been inducted through the hollow bearing, and is to be partially filled with weights or masses or lumps of some hard metal or material (for example, steel or iron). This cylinder, on the application of power, revolves on two centres or hollow bearings. The hopper having been first filled with substance for crushing is fed with a sufficient supply of water, which in its passage through the inlet pipe to the cylinder or barrel partly assists and partly forces with it the substance to be crushed. On arriving within the cylinder containing the metal weights the revolutions of the cylinder cause the weights to fall one over the other, and the substance introduced into the cylinder will be gradually reduced or crushed to the proper fineness, and will be kept in a state of suspension in the water, with which it will finally pass out at the hollow outlet bearing.

COMBUSTION OF PATENT FUEL.—The production of patent fuel was no doubt designed chiefly to utilise the small coal, which was otherwise unsaleable, but it was soon found that as a fuel for ocean-going steamers it had the great advantage over round coal that the stowage bulk was much reduced. In consumption, however, there has always been the great drawback with patent fuel that it packs itself in the furnace as carefully as it has before been packed in the bunkers, so that all draught through it is stopped, and perfect combustion is rendered practically impossible. An ingenious remedy has been devised by Mr. CHARLES WEEKES, C.E., of Swansea, who, taking for his model the rognons au brochet, so common on the Continent, conceived the idea that briquettes au brochet would be equally attractive. He perforates the centre of the fuel blocks during manufacture with a small square hole, by means of which they are "threaded" on a rod at right angles to each other alternately, and placed in the furnace in a position that insures perfect combustion without breakage or waste of any kind. It is proposed to make the fuel block only half the thickness of those now made, so as to carry the principle further toward perfection. The favourable reception which the new fuel has had is astonishing, some having gone so far as to designate it the fuel of the future, and declare that the scientific accuracy of the principle is beyond dispute.

LEAD AND LEAD MINING IN DERBYSHIRE—No. II.

BY ARTHUR H. STOKES, F.G.S.

[Read before the Chesterfield and Derbyshire Institute of Mining, Mechanical, and Civil Engineers.]

In 1753 the lease was granted to — Rolls, Esq., and about 1809 or 1810 Richard Arkwright, Esq., purchased the remainder of Rolls' lease, and from this date up to the present the lease of the mineral dues for the Duchy of Lancaster for the Wapentake of Wirksworth has been retained by the Arkwright family, the present holder being Frederick Charles Arkwright, Esq., of Cromford.

The mineral duties in the High Peak district have been since 1690 in the hands of the Dukes of Devonshire, under lease from the Duchy of Lancaster.

The lead mines of Derbyshire are divided into two districts, called the High Peak or North Derbyshire, and the Low Peak or the Wapentake of Wirksworth. Their sub-divisions are shown in the following schedule:—

EXTENT OF MINING DISTRICT.

The Mineral Courts Acts of 1851 and 1852 cover nearly the whole of North Derbyshire, often termed by the miners the king's field, and supposed to have been the property of the Crown from the period of the Norman conquest. The two districts are defined as follows:—

HIGH PEAK, consists of seven liberties.

Castleton.	Monyash.
Bradwell.	Taddington.
Hucklow.	Upper Haddon.
Winster.	

LOW PEAK.

Wapentake of Wirksworth.

Liberties of—	Tideswell.
Ashford.	Crich.
Hartington.	Stoney Middleton.
Peak Forest.	Youlgreave.
Eyam (except ancient freeholds).	Litton.

Perhaps the oldest lead mine in the county is the Odin Mine, the entrance to which is at the bottom of the hill, south of Mam Tor, on the road from Chapel-en-le-Frith to Castleton, and within a short distance of the latter place. It is supposed to have been worked by the Danes, as its name seems to import. It has been a rich lead mine, but is now closed.

Having now briefly traced the history of lead mining from the earliest dates, so far as the author has been able to obtain such information, it will be necessary to give an epitome of the various mining customs and Acts of Parliament relating to lead mining before entering upon the more practical part.

A chronological history is given at the end.

ESTABLISHED CUSTOMS AND ACTS OF PARLIAMENT.

Old customs and privileges have been handed down from one generation to another, and the miners residing in the district have been immemorially governed by such ancient laws and customs, and have continued in almost uninterrupted exercise and enjoyment of such customs and privileges, although research has failed to show that they had any written authority, their origin having baffled the most diligent enquirer. These old customs and rights are best detailed in a poem composed by Edward Manlove, and printed in 1653; also in a book called "The Liberties and Customs of the Myners," printed in 1645, and "The Articles and Customs of the King's Field in the High Peak in Derbyshire," 1601.

To show the repugnant laws contained in these old customs it would, perhaps, be sufficient to quote from Manlove's poem the part relating to theft from the mine, which is as follows:—

"For stealing our twice from the minery
The thief that's taken fined twice shall be.
But the third time that he commits such theft
Shall have a knife stuck through his hand to th' haft
Into the stow, and there till death shall stand,
Or loose himself by cutting loose his hand.
And shall foreswear the franchise of the mine.
And always lose his freedom from that time."

Another custom may here be mentioned showing the kind of punishment incorrigible miners were subjected to at the hands of the barmaster—"Art. XLIX. We say that every barmaster or his deputy ought to have a pair of stocks at some convenient place within his division."

In the year 1287 the miners petitioned the king (Edward I.) to redress their grievances, attempts having been made by the landowners to stop the trespass of miners upon their private lands. The king accordingly issued a warrant, or commission, directed to the Sheriff of Derbyshire, to call a meeting of such persons as were best acquainted with the rights and the customs of the miners. This commission was solemnly executed at Ashbourne by a jury who, by their inquisition, returned that the miners claimed by no charter, but by immemorial custom; and that, by the due observance of that custom, their rights and titles to these mines should be preserved to them. On that return the king admitted their laws and rights.

The whole of the 59 Articles which governed the mining previous to the passing of the Acts of 1851 and 1852 will be found in "The Compleat Miner," by Thomas Haughton. London, 1681.

Previous to the passing of the above-named Acts the mineral laws and customs were very uncertain and undefined, both as to the manner of working and extent of jurisdiction; and in many respects were inapplicable to the more advanced (although still rude) mode of mining. It was to remedy some of these defects that the Acts of 1851 and 1852 were passed.

The lead mining in Derbyshire is now governed by two Acts of Parliament—"The High Peak Mining Customs and Mineral Courts Acts, 1851," and "The Derbyshire Mining Customs and Mineral Courts Acts, 1852." The Acts are very similar, and a description of one will be quite sufficient to explain the various laws relating to the whole of the county. It will be seen by the date of the Acts that they were passed within one year of each other, and many of the clauses in the High Peak Act, 1851, are copied *seriatim* into the Act of 1852.

ARTICLES ESTABLISHED.

The subjects of this realm have from time immemorial claimed and exercised a right to search for, sink, and dig mines or veins of lead ore in the County of Derby within the Kings' Field, and the miners have continued in the uninterrupted enjoyment of the various customs and privileges, although they do not appear to have had any written origin, and although the landowners have repeatedly tried to stop the miners' trespass, yet the miners have eventually gained the day; for the previously named two Acts confirm them in their right of search, and the uncertain and undefined customs are now in legal operation within the district covered by those Acts of Parliament. The following is an epitome of the 29 Articles contained in the Schedule to the Acts, and will give a general idea of the curious and antiquated customs established by such Acts.

ART. I.—It is lawful for all the subjects of this realm to search for, sink, and dig mines or veins of lead ore upon, in, or under all manner of lands, of whose inheritance soever they may be (churches, churchyards, places of public worship, burial grounds, dwelling houses, orchards, gardens, pleasure grounds, and highways excepted); but if no vein of ore be found, or if the foundermeer be not freed, as provided by Art. 11, and the person making search abandon it for fourteen days, the land must be levelled and made good by the person making the search within the space of twelve clear days after the expiration of the said fourteen days, or the owner of such land may level and make good the same, and recover the expenses thereof from the miner in an action of debt in the Small Barmote Court, or in the County Court, provided always that nothing herein contained shall prevent, or hinder, the miner from following and working his vein, and searching for and getting lead ore under such excepted places; but in case by so doing he shall damage or injure any such excepted places, or the surface thereof, the owner may recover from such miner compensation for such damage, and if the workings are likely to endanger the security of such excepted buildings the Steward and Grand Jury have power to stop the workings.

ART. II.—In all cases the landowner has power to remove and sell all caulk (barytes), spar, or other mineral (except lead ore) when and as often as he thinks proper, but not to injure any mineral property.

ART. III.—The Barmaster and Deputy Barmaster shall provide a dish or measure which shall contain 15 pints of water for measuring the ore (about 14 pints in the Wapentake and 15 pints in the High Peak).

ART. IV.—The Barmaster, with two Grand Jurymen, shall provide the miners a way, either for foot passengers or carts, from the nearest highway to the mine, and also from the mine to the nearest running stream, spring, or natural pond of water. No compensation is to be claimed by the occupier or landowner for such ways, but their use is limited to persons and purposes connected with the mine, who may use also for mining purposes the water from the nearest running stream.

ART. V.—Every miner shall, so long as his mine shall be worked, be entitled, without making any payment for the same, to the exclusive use of so much surface land as shall be thought necessary by the Barmaster and two of the Grand Jury, for the purpose of spoil heaps, &c., but the miner is to fence the same to protect cattle.

ART. VI.—Any person may transfer his interest in any mine to any other person by notice to the Barmaster.

ART. VII.—When ore has been raised by any miner, and he shall desire such ore to be measured, he must give the Barmaster 24 hours notice to come and measure the same.

ART. VIII.—No person shall sell any ore, or remove any ore from the mine, unless the same shall have been previously measured by the Barmaster.

ART. IX.—The duties called "lot" and "cope" are payable to Her Majesty or her lessee.

In the High Peak the duty called "lot" is one thirteenth part of all ore raised; the duty called "cope" is the sum of 4d. for every load, being nine dishes of ore.

ART. X.—The first finder of a new vein shall be entitled to two meers in length of the said vein, one meer on each side of the founder. The third meer shall belong to the lessee of the duties of lot and cope, to be set out at either extremity of the said two meers at the option of the Barmaster. The finder shall be entitled to each subsequent meer in such vein, each way, to the extent he shall claim or require at the time of freeing. But if the lessee neglect to work his meer the finder shall have a right to purchase the said meer. The price to be fixed by the Steward and Grand Jury, or he can work the meer, and lay the ore aside for the use of the lessee, after deducting the expenses of getting the same.

ART. XI.—The Barmaster shall not set out any ground until ore shall have been raised from the mine.

ART. XII.—If the miners work without having freed the mine, or commit a trespass, the mine shall be forfeited to the lessee.

ART. XIII.—Provides for ownerships when working veins at a crossing or intersection point; and the following clauses for approaching and connected veins.

ARTS. XIV. to XVII.—Clauses providing for priority of title, trespass, and debts, which are to be tried and decided before the Barmote Court.

ART XVIII.—Every meer of ground shall contain 32 yards in length, but in a few liberties it is 29 yards in length.

ART. XIX.—If the mines are neglected, or not wrought, being not hindered by water or for want of air, then any persons may apply to the Barmaster for possession of the same. The Barmaster shall send notice to the owner, or post the notice up in a conspicuous place near the mine, stating that such a mine at the expiration of three weeks, if not duly and reasonably worked, and not other sufficient reason assigned, will be forfeited, and may give the mine to any person willing to work the same.

ART. XX.—Provides for serving notices.

ART. XXI.—A shareholder refusing to join his partners in working the mine, or pay his proportion of the expenses, shall forfeit his part.

ARTS. XXII. to XXVI.—Provide for various legal forms before the Grand Jury.

ART. XXVII.—If any person gives relief to any other mine which may be under water, the owner of such relieved mine shall pay such an amount of ore worked as the Barmaster and Grand Jury shall determine. The said portion of ore to be delivered, dressed, and made merchantable by the owner of such mine.

ART. XXVIII.—Provides for the consolidation of mines having two or more veins lying contiguous to each other.

ART. XXIX.—Provides for encroachments, and for the Grand Jury delivering their opinion as to whether any other person is working any mineral ground belonging to the persons so summoning the Grand Jury; and also for the retaining of all ore gotten, unless security be given, or until sufficient further workings shall have been done to enable the Grand Jury to form a satisfactory opinion.

The Acts themselves contain numerous clauses, and generally treat of legal points in regard to appointments, qualifications, removal, privileges, disabilities, and duties of various offices, Barmote Courts, territorial jurisdiction, penalties, grand juries, and other matters for carrying into effect the customs and liberties of miners. They also give power to all persons to search and examine all documents in the custody of the Steward upon payment of 1s., and to obtain certified copies of any proceedings in the great and small Barmote Court, and copies of entries of accounts. They also give power to the Grand Jury to make orders, &c., for working, carrying on, guidance, and protection of mines, and for regulating the proceedings of Barmote Courts.

From the above epitome it will be seen that the Acts confirm many customs that are in derogation of the common law. In the first place, all subjects of the realm may search or dig for lead ore in or under any person's land (without even asking permission of the owner of the surface); and providing the miner finds ore, and free the mine, by paying one dish to the Barmaster, he then not only claims but is entitled to sufficient surface, or land, for his hillock, or spoil heap, and calls upon two of the Grand Jury to provide a way for foot passengers or carts from the highway lying most convenient to the mine, and also water way to the nearest running stream of water. The owner or occupier of the land over which these things exist cannot claim any compensation. In short, the miner is entitled to the exclusive use of so much surface land as shall be thought to be necessary by the Barmaster and two of the Grand Jury, without making any payment for the same, or being accountable to the owners or occupiers of the soil for any damage he may do.

In case the miner raises any other mineral save lead ore, then the owner of the land claims such mineral, and the miner cannot remove the same without permission (see Article II.); thus the only compensation the landowner gets for all his annoyance and loss of surface is the right to sell and dispose of all and every other mineral raised by the miner except lead ore. In fact, the miner is only authorised to search and mine for lead ore by those customs, and hence can only sell that mineral.

It may be remarked that this is a poor compensation to the owner of the soil, that his land should be cut up, roads be made across his fields, and water ingress and egress be allowed for the use of the miner; but it must be remembered that the miners had these rights and privileges when the whole of the Peak was what might be termed a "vast howling wilderness," without cultivation, and belonging to the Crown; also that the present owners of the soil have bought the same subject to such mining rights. There is little doubt that the mining rights and income were once of far more importance than the surface value; hence it was of paramount consequence to the Crown that every encouragement should be held out to the miners to follow their calling. These customs once established the miners have tenaciously clung to them, and even fought them in the law courts. Now the Acts of 1851 and 1852 have confirmed their rights, and both owners of the land and the miners know the limit of their privileges or inconveniences. The freehold tenures of the parish of Eyam had a charter of exemption granted to them by King John, when Earl of Mortmain, previously to his being created Duke of Lancaster.

We are informed that Mr. Brough Smyth, the resident mining engineer of the Davala Moyar Gold Mining Company, has arrived in London.

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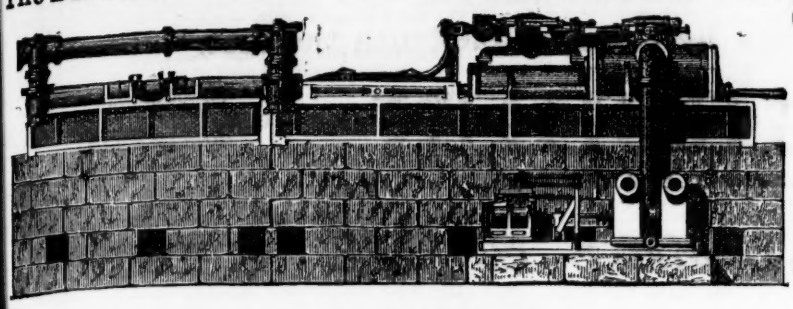

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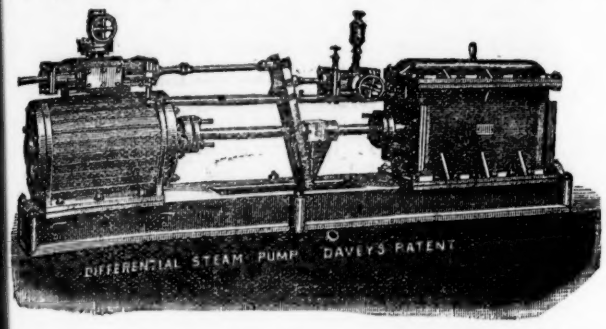

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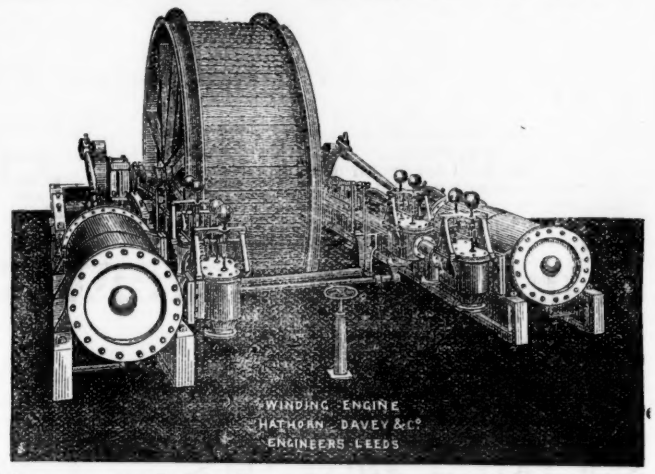

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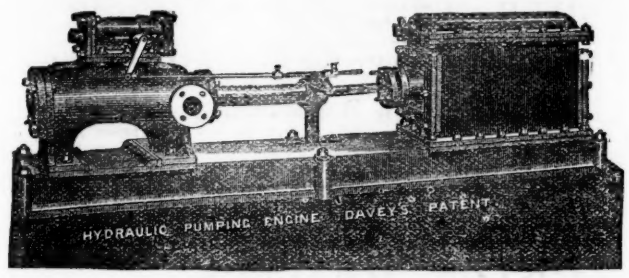

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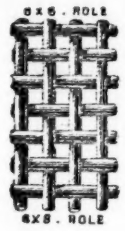

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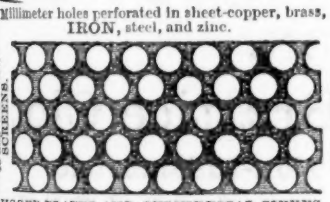

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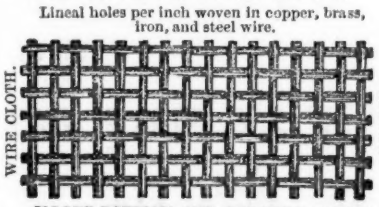

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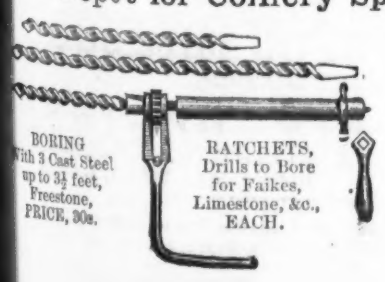

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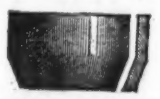

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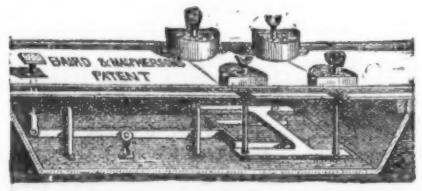

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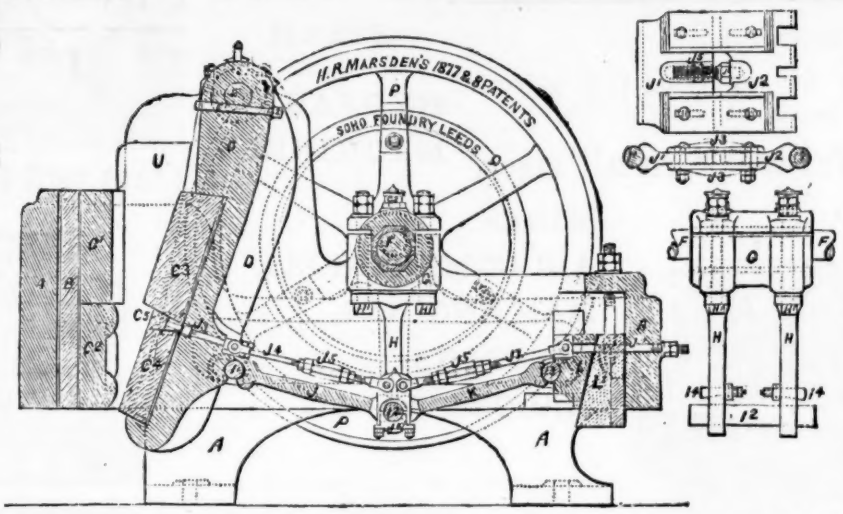

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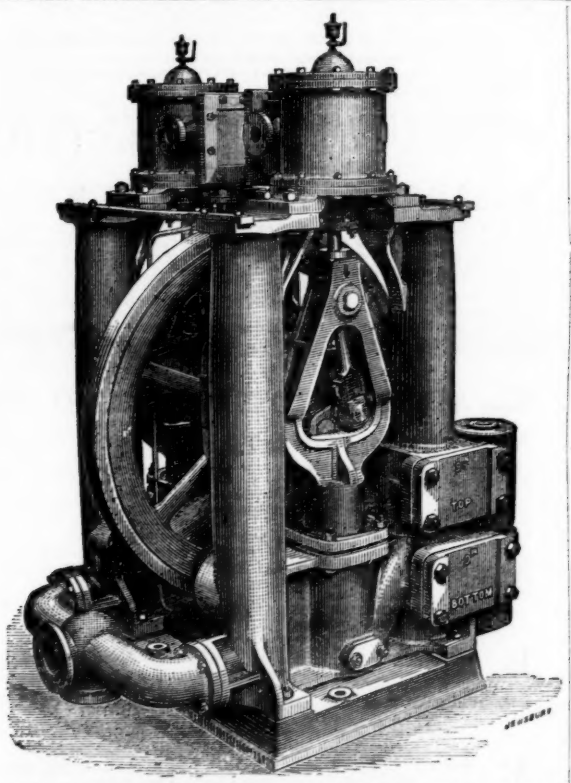

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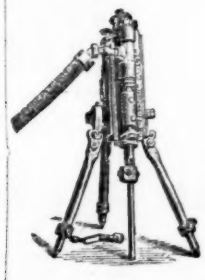

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